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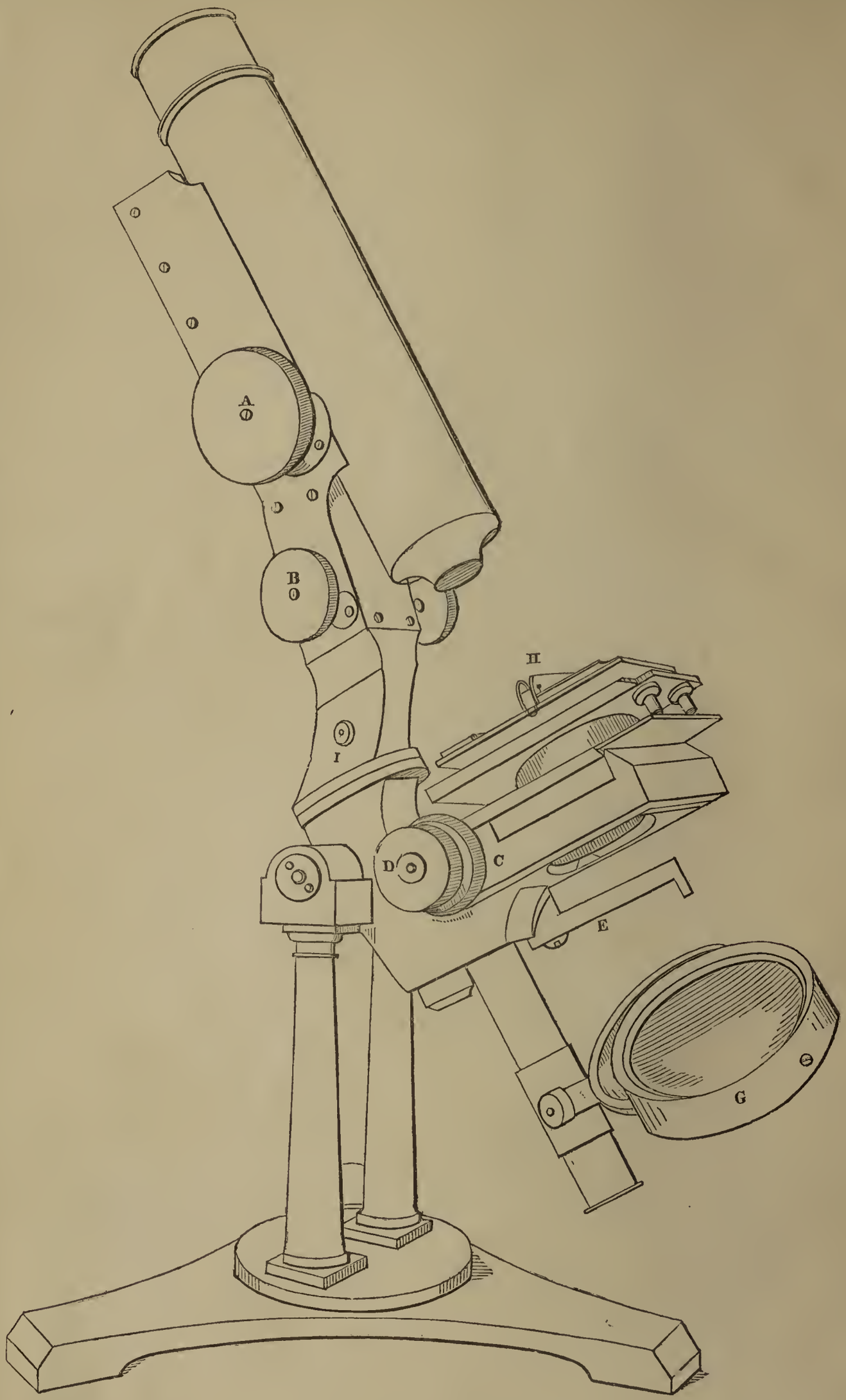

POWELL AND LEALAND'S NEWLY CONSTRUCTED MICROSCOPE.

75931

THE MICROSCOPIC JOURNAL,

AND

STRUCTURAL RECORD

FOR

1841.

WITH FORTY ILLUSTRATIVE DIAGRAMS, BY JOSEPH DINKEL.

EDITED BY

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PRESIDENT OF THE BOTANICAL SOCIETY OF LONDON,
KEEPER OF THE ZOOLOGICAL COLLECTION OF THE BRITISH MUSEUM,
ETC., ETC.,

The following Pages

ARE MOST RESPECTFULLY INSCRIBED,

AS A HUMBLE THOUGH GRATEFUL ACKNOWLEDGMENT FOR MANY ACTS OF FRIENDSHIP AND KINDNESS RECEIVED AT HIS HANDS AND IN CONSIDERATION ALSO OF HIS HIGH ATTAINMENTS AS A NATURALIST,

BY HIS LATE ASSISTANT IN THE BRITISH MUSEUM,

THE EDITOR.

ADDRESS.

The Microscopic Journal having now passed twelve months of its existence, the Editor, at the suggestion of many of the Subscribers, has resolved on doubling the number of its pages, which will, he trusts, in future enable him to cater to the tastes of the several classes of his readers with more advantage than he has been able hitherto to do. The various Sciences, now in a measure dependent on the employment of the Microscope for their elucidation, have become so numerous, that it is difficult at times to know how much of one, or how much of another to cull from the multifarious British and Foreign Journals, and Transactions of Societies continually on our table; and while the most important and interesting articles have received early insertion, those of comparatively less interest have obtained a place later in the day, owing to the hitherto limited extent of our pages. As this inconvenience will for the future be in a great measure obviated, we wish it to be generally understood that our pages will constantly be open to the insertion of all communications of standard merit, whether published at home or abroad, with the object of placing in the hands of the Microscopic Observer, all the important facts

which are scattered throughout numerous works and Proceedings of British and Foreign Societies, with a view to render the MICROSCOPIC JOURNAL a monthly periodical of importance and reference to every explorer and lover of Science throughout Great Britain. To accomplish this end, the EDITOR respectfully solicits a continuation of that support and assistance he has hitherto received from his Correspondents.

CHATHAM,
22nd January, 1842.

THE

MICROSCOPIC JOURNAL.

I.—A BRIEF SKETCH OF THE RISE AND PROGRESS OF MICROSCOPIC SCIENCE, AND THE PRINCIPAL MEANS ENUMERATED WHICH HAVE TENDED TO ITS GENERAL ADVANCEMENT.—BY THE EDITOR.

As MICROSCOPIC research is for the most part an amusement rather than a profession, it cannot be a matter of surprise that many resort to it as a means of intellectual pastime, which is sure to terminate in beneficial results.

General knowledge may be acquired by observation—recondite science by application alone—and the existence of the former in the mind of the apparent tyro, by industry and perseverance imperceptibly produces the latter. How many are there who recur with delight to the growing taste which has slowly but sensibly advanced with the years, months, or days, they have devoted to the examination of the minutiæ of nature. How many are there, who, deprived of the enjoyment of health, and whose lives have been devoted amidst anxiety and fatigue to the pursuits of science, find in their retirement a never failing source of amusement and instruction in the microscope ; and who discover within their threshold, at every season, objects for contemplation in the vast sphere of nature, the examination of which tends to ameliorate the disposition, strengthen the comprehension by the rational exercise of the mind, and render visible, even in the most inconspicuous of objects, evidences of an Omnipotent Artificer. But, to be brief—let us now consider, at a general glance, the rise and progress of microscopic science in England, within the last fifteen years, by stating the principal and very gradual means by which the taste at present existing has been so effectually established.

At the instigation of Dr. Goring in the years 1824 and 1825, TULLEY constructed the first achromatic objectives made in this country, and termed by him the "triple object glasses." Every merit is due to these gentlemen for their exertions in thus improving and laying the foundation for opticians to work upon, who, unacquainted with what the continental opticians were doing, brought before the public the result of their labours much about the same time as SELLIGUE in France, FRAUNHOFER of Munich, and AMICI of Modena.

In the Philosophical Transactions for 1830, Vol. 120, p. 187, will be found an elaborate paper by Mr. Joseph Jackson Lister, "On some properties in achromatic object glasses, applicable to the improvement of the microscope," in which he gives "the formulæ for working object glasses of short foci and large aperture, with a view to increase the power and the ease of manufacture." It must on all sides be admitted that these researches of Mr. Lister worked a great change in the microscope, and have since they were promulgated, formed the basis on which opticians of late years have worked,— rendering it the most eventful era in modern microscopic improvement. The interest and anxiety this unpretending philosopher has, up to the present time, evinced in supervising and assisting those whose lives have been devoted to the subject, and who now rank as the first manipulators of the age, merits on all sides the greatest praise.

The first and most important attempt to develope to the public gaze the microscope on a large scale, was made by Mr. Carpenter, of Regent street, who for many years exhibited a solar microscope, for the gratification of the public. The uncertainty, however, of the weather, and state of atmosphere generally, in this country, and more especially in the metropolis, was the great obstacle to this exhibition. This difficulty, at first sight insurmountable, was at length overcome by Mr. J. T. Cooper, who had for many years applied for private purposes, the oxy-hydrogen gases projected on lime, (known generally as the oxy-hydrogen light) as a means of illustrating in his laboratory and lectures, many of the important facts connected with light.

At a meeting of a few scientific friends to witness the results of some experiments with this light, at Mr. Cooper's laboratory, then at the Aldersgate street School of Medicine (twelve years since) Mr. Cooper and Mr. John Carey, of the Strand, feeling assured of the principle and stability of the application, proposed to apply this substitute for the solar rays to the illustration of microscopic power, and accordingly arrangements were made, and a microscope constructed, adapted expressly to the peculiar nature of the light, which, as is well known, differs in many respects from that received from the sun. The first microscope (an experimental one) was opened in the Strand in the year 1832, nearly opposite the end of Norfolk-street ; this spot was selected on account of the contiguity to Mr. Carey's workshops, as a matter of convenience only. When by dint of much time and experimental application, Messrs. Cooper and Carey had accomplished their labours to their satisfaction, the scientific public it will be remembered, were invited to attend at 21, Old Bond-street, on 18th of February, 1833, to witness

the first public exhibition of the kind ever presented, in which the oxy-hydrogen light was made to perform all that had been hitherto effected with direct solar light; and it is but justice to those gentlemen to affirm, that this exhibition was considered to be, both by scientific men and the public at large, not only most creditable to the labours of the projectors, but the most interesting and important that had ever been offered to the public, and which could not fail to attract the attention of persons in every age, rank, and station in life; — but possessing the noble aim of enlarging the views of the multitude, by drawing their attention to the wonderful and beautiful adaptations of nature to secure her end. No exhibition was for a period better attended than was this; others in the course of a short time sprang up in various parts of the metropolis and the provinces, and two are even daily exhibited at the galleries of Practical Science in London, forming the leading attraction, and exciting the general interest and amusement of those who visit these institutions.

We have dwelt rather longer on this part of our subject, than it was our intention to do. We shall at all times be advocates for giving "*merit where it is due,*" and as we do not find a representation of the above facts in a work recently published, expressly on the subject of the "Oxy-hydrogen Microscope" by a Philosophical Instrument Maker, we have considered it but fair to place them on record.

The application then of the hydro-oxygen light to microscopic purposes, by Messrs. Cooper and Carey in the place of the very uncertain means (solar light) by Mr. Carpenter, created at this period a *very general* taste for microscopic science. But, although the subject was thus treated on a very extensive scale by such exhibitions, the minutiæ had long before, and were even then, daily attracting the attention of the scientific world, especially of Robert Brown, F. Bauer, R. H. Solly, Lister, Cuthbert, Pritchard, Goring, and a host of others.

But it must on all sides be agreed, that every praise and commendation the world can bestow, are due to the indefatigable exertions of Mr. Bowerbank, who by his well known liberality in promoting the cause, has at length succeeded in diffusing that growing taste for microscopic research in the metropolis, characteristic of the present age. To this gentleman's liberality, in opening his house weekly, for the purposes of microscopic illustration, is in a great measure to be attributed the first dawn of encouragement to the rising scientific generation. Ever ready, ever desirous, and ever interested in the tyro's cause, he must have created in the minds of those, seeking such valuable aids, every regard and esteem: and especially when we consider that the

limited means of investigators formerly, and even at the present day, have not allowed them such splendid instruments and practical facilities in the manipulation which the fortune and talents of Mr. Bowerbank, enable him so amiably and freely to dispense to those who seek his advice and experience.

The competition which microscopic investigators have succeeded incessantly in keeping up for years between Mr. Powell and Mr. Ross (and to whose names must now with all credit be added, that of Mr. Smith) has materially tended to the advancement of microscopic science; it has had the beneficial effect of developing a taste for competiton between the parties, and of rousing the hitherto dormant spirit of opticians to vie one with the other, and the results which have been, and are daily manifesting themselves at their hands, are of the most important and satisfactory nature.

All these considerations and facts combined have ultimately led to the establishment of the "Microscopical Society of London." A society, having so distinguished a President, whose name and fame as an explorer of nature is too well known to require comment here, and supported as it is by names which may be reckoned "Ornaments to the nation," there cannot be a doubt that this Society will work great benefits to science in all its branches.

II.—ON THE STRUCTURE OF FOSSIL TEETH FROM THE CENTRAL OR CORN-STONE DIVISION OF THE OLD RED SAND-STONE, INDICATIVE OF A NEW GENUS OF FISHES, OR FISH-LIKE BATRACHIA, FOR WHICH IS PROPOSED THE NAME OF DENDRODUS.*

By Richard Owen, Esq. F.R.S., President of the Microscopical Society, &c., &c.

The fossil remains, which form the subject of the present paper, consist of three detached teeth, which were transmitted to me by Dr. Malcolmson. They were found in the quarry of Scat-crag, near Elgin, which belongs to the central, or Corn-stone division of the Old Red Sand-stone.

These teeth present no very remarkable peculiarities of external form; although each had sufficiently distinctive characters of its own, they

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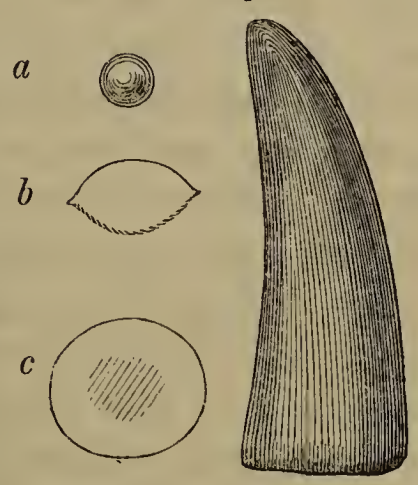
* Read at the Microscopical Society of London, Feb. 17, 1841, and communicated by the Author.

differed also from one another in size as well as form. The first and largest specimen, (*Fig.* 1.) which measures one inch and a half in length, and half an inch across the base, resembles the teeth of the crocodilian reptiles in general form, but differs in being solid; presenting a very slight excavation at the base. It is conical, rounded at the base (*a*), but becoming subcompressed in the crown (*b*), slightly bent, and gradually diminishing to an obtuse rounded apex (*c*): in this respect resembling certain of the teeth of the *Labyrinthodon;* it resembles the teeth of this family of extinct Batrachia still more essentially in being impressed with numerous fine equi-distant longitudinal striæ, about half a line or rather less, apart; but it is also traversed by two opposite longitudinal ridges; the surface of the tooth is otherwise smooth. From the roughness of its base, the margin of which is rounded in, I suspect that the tooth was originally anchylosed to the base of a shallow socket, as in the Labyrinthodon and in certain fishes, as *Dyctyodus* and *Sphyræna.* The absence of any remains of Vertebrate animals, higher than the class of fishes, from the Old Red Sand-stone system, and the remarkably characteristic structure of the teeth of certain low-organized reptiles from the New Red Sand-stone; viz., those of the genus *Labyrinthodon,* led me to resort without delay to the microscopic test, in order to gain further insight into the nature and affinities of the ancient Vertebrata indicated by the scanty organic remains alluded to at the beginning of this paper. I commenced, therefore, by having prepared two transverse sections of the tooth just described, which I propose to indicate by the name of *Dendrodus biporcatus.** The annexed cut exhibits the tooth of its natural size. The section taken from near the base of the tooth was examined, by transmitted light, under an inch objective of Ross's Compound Achromatic Microscope.

Fig. 1.



Thus magnified, a central pulp-cavity of relatively small size, and of an irregularly lobulated form is discerned, a portion of which is shown at (*Fig.* 2, *a*); is immediately surrounded by the transverse sections of large cylindrical medullary or pulp-canals of different sizes; and beyond these there are

* This name is given in reference to the opposite ridges by which the tooth is characterized.

smaller and more numerous medullary canals. These are processes of the central pulp-cavity; viewed in the transverse section they are connected together by a net-work of medullary canals, belonging to a coarse osseous texture, and this structure occupies the middle half of the section. All the above cavities were filled by the opaque matrix.

Fig. 2.

Nat. Size.

a

From the circumference of the central net-work straight medullary canals radiate at pretty regular intervals to the periphery of the tooth, most of these canals divide once, rarely twice, in their course; the division taking place sometimes at their origin, in others at different distances from their termination; and the branches diverging slightly as they proceed. Each of the above medullary rays is continued from a short process of the reticular structure, which is connected by a concave line with the adjoining process, so that the whole periphery of the transverse section of the central coarse reticular medullary body of the tooth presents a crenate outline, and sends off at brief intervals, through its whole course, short branches slightly inclined towards the periphery of the tooth. Throughout the whole extent of each ray and its primary dichotomous divisions, short branches are sent off at brief intervals, generally at right angles with the trunk, or slightly inclined towards the periphery of the tooth. These subdivide into a few short ramifications, like the branches of a shrub, and terminate in irregular and somewhat angular dilatations, simulating leaves, but which resolve themselves into radiating fasciculi of calcigerous tubes. There are from fifteen to twenty-five or thirty-six of these short lateral branches on each side of the medullary rays.

In a section of the same tooth, one third from its obtuse summit, the irregular central pulp-cavity was lost, and in its place there were a few large medullary canals connected by a fine net-work of smaller canals. This tissue occupied rather more than one third of the diameter of the section. From its periphery there was continued the same system of nearly straight, sparingly dichotomizing medullary canals, radiating at regular distances from the central tissue to the periphery of the tooth. The radiating canals here also give off short

lateral branches, but these do not terminate in such well-marked dilatations as those observable at the base of the tooth. The transverse branches are generally given off from short alternate lateral bendings of the main stem. There are about forty radiating medullary canals in this part of the section, and about fifty in the section taken from the base of the tooth.

At this part the angular dilated terminations of the small lateral branches form, as has been said, the centres of radiation of a system of the most minute calcigerous tubes, each system constituting a lobe of the dentine, separated from the adjoining lobes by an extremely thin layer of cement. In the section nearer the apex of the tooth, the radiating systems of calcigerous tubes, forming similar lobes of dentine, are given off more from the sides of the lateral branches than from their terminal dilatations. The peripheral extremities of the medullary rays, and of such of their subdivisions or branches as are nearest to and directed towards the margin of the section, and consequently to the periphery of the tooth, are resolved into fasciculi of calcigerous tubes, which diverge in graceful curves from their point of origin. The central tubes are continued from the interspace of the diverging ones to the periphery of the tooth, in a line parallel with that of the main medullary canal which radiates from the central reticulation; the other tubes gradually diverge more and more from this line, and those which proceed from the sides of the extremity of the medullary canal run at right angles to its course. The lateral tubes terminate, together with those of the adjoining medullary canal, in a linear series of calcigerous cells; which line is continued inwards from the periphery of the tooth, like a process of the external capsule, inclosing and defining, as it were, each of these terminal square lobes or systems of calcigerous tubes; there is a slight indentation of the periphery of the transverse section at the line of the above described inflection of the cellular structure; and this indentation is a section of one of the fine superficial longitudinal striæ, already mentioned. The inflected line of minute cells may be traced, in each case, to near the central reticulated system of medullary canals, sending off branches on each side, which bound in a similar manner the different lobes of dentine or systems of radiated calcigerous tubes which are given off from the sides of the straight medullary canals. The external longitudinal fine grooves on the superficies of the tooth indicate, as above mentioned, the entering lines of the fine cellular cement, or the interspaces of the lobes of dentine appended to the medullary canals which radiate from the central pulp-cavity or net-work. The medullary rays, though, for the convenience of description they have been termed

canals, as they appear to be in the transverse section of the tooth, yet are probably not cylindrical tubes. For it must be obvious from the similarity of the appearances of the two sections here alluded to from nearly the two opposite extremites of the tooth, that the radiating lines, described as medullary canals are, more probably, sections of vertical fissures, or lamelliform processes of the pulp, radiating from the central body of the pulp and co-equal with the longitudinal extent of the tooth; but decreasing in number as the tooth contracts towards its apex.

[To be continued at page 17, and concluded.]

III.—ON THE KERATOSE OR HORNY SPONGES OF COMMERCE.*

By J. S. Bowerbank, Esq. F.G.S., &c.

At the commencement of the communication, Mr. Bowerbank alluded to the valuable researches of Dr. Grant,† in which he has not only detailed the general forms and structure of the various tribes of sponges, but traced their animal nature, which he has proved beyond all doubt by investigating their mode of propagation. The conclusions arrived at by Dr. Grant are that these *Poriferous* animals are composed of a minute reticulated tissue, which derives its support from a thread whose structure is either horny or cartilaginous, hence called *Keratose;* or from the dispersion through its substance of numerous *silicious* or *calcareous* spicula. The generic differences are established according to which of these structures prevail. Mr. B. alluded to those termed *Keratose* described as being composed of *tubular* fibres and *destitute* of spicula; these embrace the Sponges of Commerce, &c.

Dr. Grant's observations were limited principally to the British species of sponge having *siliceous* or *calcareous* spicula: the true Horny (*Keratose*) species not having up to that period been found on our coast. Sowerby in his "British Miscellany" has subsequently figured the *Spongia pulchella* obtained from the southern and western coasts of England. Mr. B. then gives Dr. Fleming's description of the genus *Spongia*—"Porous, the cartilaginous skeleton simple, or destitute of earthy spicula;" characters which will be presently shown from the investigations and researches of Mr. B. to be of little or no importance. The author was led to investigate this subject on account of having had a very extensive collection of sponges (amounting to forty species) presented

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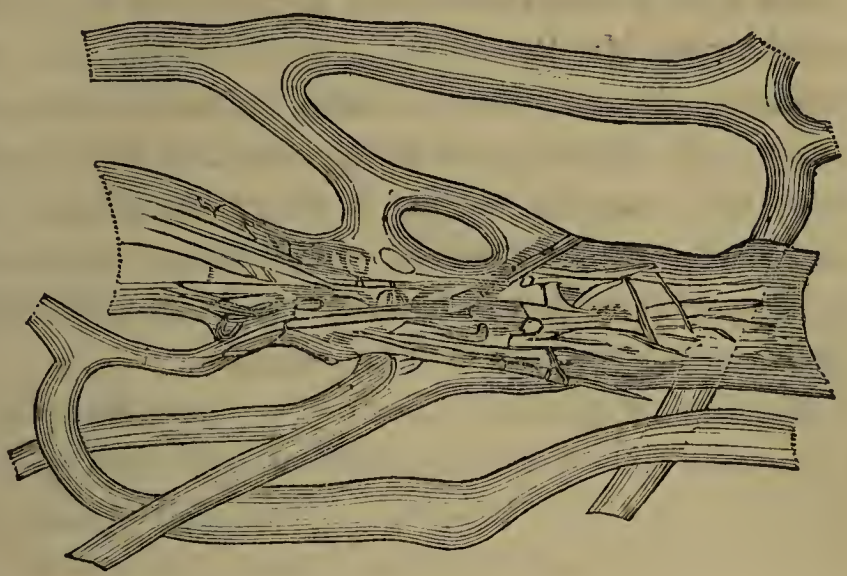
* (Abstracted from the Paper read before the Microscopical Society of London, January 27, 1841.)

† New Edinburgh Philosophical Journal, 1827.

to him by Rupert Kirk, Esq. obtained from Sydney, Australia. Many of these specimens had all the appearance of being true *Keratose* species, but which were afterwards, on examining them with a power of three hundred *linear*, found to possess these bodies imbedded, to a greater or less extent, in the substance of the fibre as represented in the annexed diagram;* they are not always to be found, at first sight, and in some cases not until a patient search has been made. In some instances it is even requisite to burn some quantity before the blow-pipe, and to subject the ash to the action of dilute muriatic acid, previous to examining the residue.



The results obtained from the examination of the Australian species, led Mr. Bowerbank to investigate the Keratose Sponges of Commerce, which he obtained previous to their being prepared as is customary by bleaching and cleaning.

In commerce two kinds of sponges occur:—the *Turkey*, which is of the finest texture, and obtained from the Mediterranean, two species of which Mr. B. makes out; and the *West Indian*, the source of which is principally the Bahama Islands, and consists of one species only.

The division of the Turkey sponge is not ascertained until carefully examined by the microscope. The ordinary prepared sponge of commerce (Spongia Officinalis, *Lam.*) exhibits a smooth light amber-coloured fibre, but if the specimen be examined in its natural state, it will often be found to be coated with a rugous film, containing minute granulations, the entire object being of a darker colour than in the previous instance. Mr. B. considers these granulations to be the incipient gemmules of the sponge, and there appears every probability for this conjecture. Dr. Grant has minutely examined and described the gemmules in numerous British species of *Halichondria*.

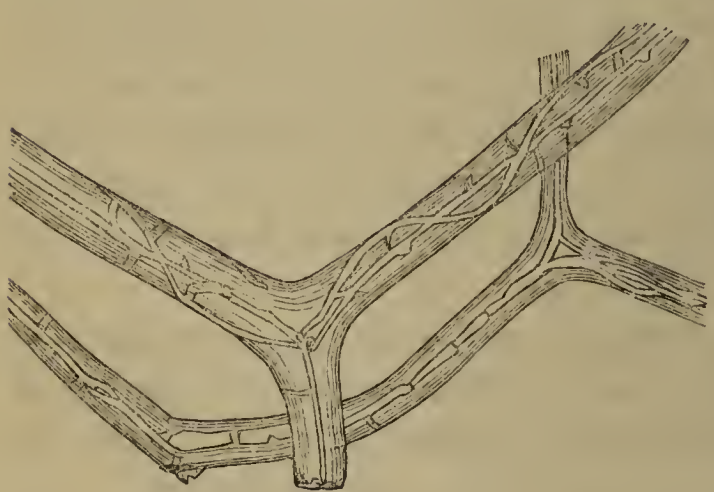
The spicula are mostly to be observed in the sponges of commerce, in the larger flattened portions of the fibre, and not in the finer

* The drawings represent pieces of the two species of Mediterranean sponges, and *not* Australian sponges.

anastomosing transparent threads which are of various sizes—this occurrence is seen in the foregoing diagram—the number of spicula is by no means constant. They assume various forms, and are possessed of a central cavity lined with membranes.

The solid nature of the fibre of the Keratose sponges is best observed with a Lieberkuhn, and a power of about five hundred linear; and the plan Mr. B. adopts as a convenient and satisfactory mode of preparing the object is to take a piece of sponge, and tie it tightly round with thread, so as to approximate the fibres and form a dense mass, and then by cutting it with a sharp knife at right angles to the axis. The cut extremities of the fibres when examined as an opaque object exhibit no internal cavity, they are solid throughout, and water produces no change in their appearance.

The second species of Turkey sponge cannot be distinguished from the common one without the aid of high magnifying power, (five hundred linear) its form and general characters agreeing so much with it. It is, however, at once to be recognized by a beautiful, branched *vascular tissue* of various dimensions, which surrounds in great abundance nearly every fibre of its structure, (as seen in the diagram) many of the ramifications of which terminate in *Cæca*. Mr. Bowerbank has ascertained that these vessels are not imbedded in the substance of the fibre itself; but, are enclosed in an external membrane or sheath, covering the solid fibre.



In some of the vessels Mr. B. observed numerous small globules, somewhat analogous to those of the blood of the higher animals of a circular form, and varying in diameter from the $\frac{1}{16,666}$th to the $\frac{1}{50,000}$th of an inch. The mean diameter of the vessel was the $\frac{1}{9,346}$th of an inch, and the diameter of the fibre on which the vessel anastomosed measured $\frac{1}{588}$th of an inch. This structure is not confined to the Turkey species, but has also been observed by the author on many of the Australian sponges.

The only true tubular recent sponge known to Mr. B. is the *Spongia fistularis* as described by Dr. Grant, specimens of which he has satisfactorily examined, and which he proposes to separate from this group, and has suggested the generic name of *Fistularia*. This separation is

considered by the author to be the more necessary as tubular species are not uncommon among fossil sponges.

Mr. B. also made some observations on the nature and structure of the *spicula*. He cannot reconcile himself to the description given by Dr. Grant: viz. "they appear to be tubular like many natural crystals," as he is not aware of the existence of true cylinders in crystalline bodies, such as the silicious and calcareous sponges present. Neither can he agree with Professor Rymer Jones on the identity of these with the *raphides* or crystals formed in the cells of plants; these bodies are solid, and in no case cylindrical, they are mere adventitious bodies in the vegetable kingdom; and cannot, therefore, be compared with the *spicula* which occur in sponges, forming a portion of the organization of the animal. The normal form of either kinds of *spicula* Mr. B. considers to be always the same, another proof of their animal deposit; and is inclined to consider with Dr. Grant that, "they are formed from materials due to the vital energies of the animals, and form normal and necessary parts of its structure, like the solid skeletons of higher animals."*

OBSERVATIONS ON MICROSCOPIC MEASUREMENT.†

By George Jackson, Esq., Surgeon, &c.

Although I have nothing new to communicate, I am induced to offer a few observations on this subject from having known many persons in possession of good instruments, who are not aware of the very simple means by which they can obtain accurate measurements of the objects of their research.

When single Microscopes were the only ones capable of being employed in scientific investigation, the micrometer consisted of a slip of glass ruled with fine divisions, varying from $\frac{1}{100}$th to $\frac{1}{1000}$th of an inch. On this the object was laid, and an attempt was made to see it and the lines at the same time.

Except when using a low power, or in the case of a very thin object, this could scarcely be accomplished; and if the bodies to be measured were immersed in a fluid as is generally the case, the lines on the glass were totally invisible. It was also inapplicable to opaque objects, and even to transparent ones after they were mounted.

The perfection to which compound microscopes have been brought

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* Outlines of Comparative Anatomy.

† Read at the Microscopical Society of London, September 23, 1840.

has afforded the opportunity of applying to them the different micrometers used with telescopes. The best of these is the wire micrometer. It consists of two parallel cobwebs, stretched across the field in the focus of the eye-piece, which can be separated by a fine screw, the head of which is divided into one hundred equal parts. The side of the field, which is a paralellogram, is also indented with notches made by the threads of the same screw, so that the number of turns can be read off in the field of the instrument, and the fraction of a turn on the divided head. The mode of using it is as follows :—Place a glass micrometer on the stage, and separate the wires by the screw until they exactly coincide with two of the divisions, when the number of turns, and decimal parts of a turn equivalent to the space included between the divisions will be the data from which the value of the screw may be calculated. Suppose for example, that it requires 3.65 turns to separate the wires in the eye-piece, so as to make them coincide with the divisions of the thousandth of an inch in the stage, the value of each division on the screw-head will then be $\frac{1}{365,000}$th of an inch. This instrument when well made is rather expensive, and requires some care in using; and as its accuracy is founded entirely on that of the glass micrometer used in finding its value, measurements made by it are by no means so delicate as they appear to be.

A more simple method of ascertaining the dimensions of a minute object, is to substitute for the wires and screw, a piece of glass divided by lines, with every fifth cut either longer or deeper, so as to be readily counted. This may be set in a cell and dropped on to the stop in the ordinary negative eye-piece, and the value of the divisions found in the manner before mentioned. It should be observed, that in using either this or the wire micrometer, a fractional value inconvenient in practice may be avoided by lengthening the body of the microscope by means of a draw-tube, until the divisions on the stage coincide with some convenient decimal number. When this process has been gone through with each object glass, a table should be written containing the value of the divisions, and the length of the tube drawn out; so that measurements may be made by any of the object-glasses without the trouble of constantly appealing to the micrometer on the stage.

A mode of applying the stage micrometer *directly* to the measurement of small bodies has been long used by J. J. Lister, Esq., with whose permission I describe it. Place the microscope horizontally, and with the Camera-lucida sketch the outline of the body to be measured; then remove the object from the stage, and substitute the divided glass in its place, throwing the image of it by the Camera over the sketched out-

line. In this way a very accurate measurement may be made, for it is evident that the object and the micrometer are viewed with precisely the same magnifying power; and if the drawing is intended to be preserved, a sketch of the micrometer may be made on the margin, which may be used as the scale generally attached to a map or plan. This plan may be modified by sketching the micrometer with each object-glass and eye-piece, laying these sketches under the prism of the Camera-lucida, and throwing the image of the object at once on them. If these sketches be made with the eye exactly ten inches from the paper, by comparison with a rule divided into inches and tenths, they will give the magnifying power of the instrument more accurately than the ordinary mode.

In using the Camera-lucida some eyes require a lens, either convex or concave, placed beneath the prism to enable them to see the point of the pencil clearly. This, by magnifying or diminishing the apparent size of the paper, diminishes or magnifies the relative size of the drawing made on it, and therefore must not be used in taking the power of the instrument; but in measuring bodies on the stage, it is of no importance, as the micrometer and object are both equally affected by it, and consequently their relative sizes remain the same.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

January 27th, 1841.—*Richard Owen, Esq. F.R.S. President, in the Chair.*

Mr. George Whipple was elected a member; and Messrs. Joseph Jackson Lister, and Wm. Greening were elected auditors, to examine and report upon the state of the accounts at the Anniversary Meeting.

Mr. Owen exhibited specimens of the teeth of the *Labyrinthodon*, described by him at the last meeting of the Geological Society; and explained the peculiarities of the dental structure, in that extinct genus of reptiles.

Mr. C. Varley stated that he had brought to the Society a new form of microscope, in which he had introduced some improvements upon his former mode of effecting the stage movements, with a view to facilitate the examination of minute living animalcules by enabling the observer to keep them within the field of vision under their most rapid movements.*

Mr. J. S. Bowerbank read a paper "On the Keratose, or Horny Sponges of Commerce," a full abstract of which will be found at page 8.

The meeting then resolved into the usual conversazione.

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* It is Mr. Varley's intention to lay this improvement before the Society of Arts; it will be inserted as soon as made known.—Ed.

February 15*th* 1841.—*Anniversary Meeting. The President in the Chair.*

The Council reported, that the number of members now amounts to 177. That the constitution and by-laws of the Society had been determined on and printed, together with a list of the members, and that these had been distributed among the members. The Council having also determined to reprint the list annually. The number of papers and communications, on subjects connected with microscopic research which had been read at the ordinary meetings of the Society amounted to 18. The MSS. of these papers had all been presented to the Society by the respective authors, together with a portion of the drawings, diagrams, and specimens, by which they had been illustrated.

Several contributions to the Library and Microscopic Cabinet were alluded to as having been received.

The auditor's report was then read, from which it appeared that the receipts of the Society, since its commencement in January 1840, amounted to £354 18*s*. consisting of the admission fees, and annual and life subscriptions; that of this sum £64 2*s*. 9*d*. had been expended for the various purposes of the Society, leaving a balance of £290 15*s*. 3*d*. of which there were in the Treasurer's hands £40 15*s*. 3*d*. and at the bankers' £250.

The President then read the Annual Address from the Chair. After alluding to the circumstances in which the Society had originated, he congratulated the members upon the degree of prosperity which it had in so short a time attained, and which had exceeded the most sanguine expectations of its original projectors, and then proceeded at considerable length to review the labours of the past year, and the contributions which had been made to Microscopic Science in reference to Minute Anatomy, Animal and Vegetable Physiology, Zoology, and Palæontology; as well as the attempts which had been made to improve the microscope itself as an instrument of scientific research; and he concluded by deploring the loss, by death, of two distinguished members, Dr. Todd of Brighton, and Mr. Field, Surgeon to the Charterhouse, and Chairman of the Society of Apothecaries in London. Upon the former of whom he pronounced a high eulogium, which was called forth by the almost unexampled ardour of that individual in the pursuit of anatomical and physiological science, and in the collection of specimens illustrative of obscure or debateable points in physiology and pathology, of which valuable collection it was announced that the greater part had been purchased by the Royal College of Surgeons in London, for the purpose of being placed in their museum.

At the conclusion of the Address, it was proposed by Mr. Solly, and seconded by Mr. Bowerbank, and carried unanimously, that with the President's permission the Address be printed and distributed among the members, and the Address was ordered to be printed accordingly.

The meeting then proceeded to elect by ballot the officers and members of Council for the ensuing year. The following gentlemen

were then elected:—Richard Owen, Esq. *President;* N. B. Ward, Esq. *Treasurer;* and Dr. Arthur Farre, *Secretary.*

The four following gentlemen were then elected Members of the Council, viz. J. G. Children, Esq., J. E. Gray, Esq., John Dalrymple, Esq., Henry Reynolds, Esq., in room of the four following who retire: Dr. Frederic Farre, Dr. Lindley, Rev. Charles Pritchard, and M. J. Rippingham, Esq.

February 17.—*The President in the Chair.*

Professor Ehrenberg and Professor Purkinje of Breslau were elected Honorary Members, and Mr. Daniel Cooper, an Ordinary Member.

Mr. Richard Owen having vacated the Chair (which was taken by the Treasurer, Mr. N. B. Ward), he proceeded to read his paper, accompanied by drawings and specimens, "On the structure of fossil teeth from the central or corn-stone division of the old red sand-stone, indicative of a new genus of fishes, or fish-like Batrachia, for which is proposed the name of *Dendrodus*." The first part of this paper will be found at page 5 in the present number.

In the absence of discussion the Meeting adjourned until March 17th, and the usual conversazione, and examination of objects commenced.

Microscopical Memoranda

A New reflecting Microscope.—Mr. Guthrie modifies Amici's Microscope, by removing altogether the plane speculum, and placing the object to be viewed in the axis of the tube. This arrangement is to the microscope, what Sir W. Herschel's is to the reflecting telescope. In order that the object may be properly illuminated, the part of the tube next the mirror is wholly removed, and three pillars substituted for it, to one of which the stage for the object is attached, and regulated by an adjusting screw.—*Jameson's Journal,* No. 44.

On the Existence of Infusoria in Plants.—Rœper has shown, that the cells of *Sphagnum obtusifolium* (Bog-moss), contain little openings into which the animalcule, *Rotifer vulgaris,* under favourable circumstances, might enter. Morren has recently observed, with the aid of high magnifying power, that in specimens of *Vaucheria clavata,* found at Everghem, he distinctly detected the same animalcule, with its ciliæ imitating the wheel, &c. Morren one day opened one of these cells, and waited to see the animalcule spring out and enjoy the liberty so dear to all creatures, even to infusorial animals; but no—he preferred to bury himself in his prison, descending into the tubes of the plant, and to nestle himself in the middle of a mass of green matter,—rather than swim about freely in the neighbourhood of his dwelling.—*Abridged from Morren's Paper in Ann. Nat. Hist. Jan.* 1841.

Turpin on the cause of the Red Colour of Agates.—The red colour of Agate is owing to a number, greater or smaller, of *Protococcus Kermesinus* (one of the lower Algæ), accumulated together, or more frequently reduced to their small red globules (seminules) agglomerated or coagulated, and distributed according to certain circumstances, in the colour-

less structure of these silicious compounds. By microscopic and comparative investigation, Turpin was led to conclude that, the various colours, rose, orange, blood-red, and reddish-brown (varieties owing to more advanced growth) which are enclosed in, or which surround the translucid and colourless structure of different kinds of Agates, will be found to be owing to the presence either of red globules, uniformly mixed as in the Carnelian Agate, or agglomerated into small irregular clots, and distributed into circular waves, according to certain forms or conditions which existed at the time of the silicious conglomeration; or, finally, though more rarely, to these small red vegetables themselves, quite entire, and most distinctly visible with the microscope. It is impossible to find a resemblance in colour and polish more striking, than that which is seen in a white glass phial filled with *Protococcus Kermesinus*, when compared with a carnelian, as may be fully established by the trial.—*Turpin in Jameson's Journal, Vol.* 25.

Instrument for measuring Refraction.—At one of the recent meetings of the Royal Physical Society of Edinburgh, Dr. Wilson exhibited an instrument for measuring the refracting powers of different substances, invented by Mr. Alexander Bryson, of Edinburgh. The instrument consists of a compound microscope with a moveable platform underneath, for holding the refracting medium over a fine line, which is to be viewed through it. The platform must be raised or lowered, until the line is distinctly seen through the microscope, and as the distance at which this takes place depends on the refracting power of the medium, the graduated scale on which the platform moves indicates the refracting power. Dr. Wilson considered the invention of great importance to the mineralogist and the chemist, as it enables them to ascertain the refracting power of very minute substances.—*Inventor's Advocate, No.* 77.

New Species of Auricula.—On carefully examining sand from Van Diemen's Land, with a view to discover microscopic shells, my attention was directed to four small shells of the genus *Auricula*, for which I propose the name of *A. pellucida*. It is thus characterized:—*Testa minimâ, ovatâ, obtusâ, albidâ, nitidâ; spirâ brevi; longitudinaliter transversimque tenuiter striatâ: labro non reflexâ; columellâ biplicatâ.*

Shell hardly a line in length, pellucid, obtuse, with two small plaits on the pillar lip, the upper of which is the larger, and projects farther into the mouth of the shell. The four specimens above described are in the collection of the British Museum.—*Editor.*

Microscopic Objects.—We have much pleasure in recommending to the notice of Microscopists Mr. C. M. Topping, of No. 26, Bride Street, Liverpool road, Islington, who has devoted himself with much zeal, for the last three or four years, to this increasing business. His terms are moderate, and the objects very carefully prepared.—*Editor.*

V.—ON THE STRUCTURE OF THE TEETH OF DENDRODUS STRIGATUS AND DENDRODUS COMPRESSUS,

By Richard Owen, Esq., F.R.S., &c. Pres. Micros. Soc. Lond.

[Continued from page 8.]

A SECOND and smaller tooth from the same formation and locality differs from the preceding in its more elongated and slender conical form, with a nearly circular transverse section as seen in the margin; it also differs in the absence of the two longitudinal ridges, and in the presence of broader, deeper, and more close-set longitudinal impressions, separated by intervening convex ridges. As those characters strongly indicate a specific difference, it may be convenient to attach to this the name of *Dendrodus strigatus*; (fig. 1.) its microscopic structure, as shown by a fine transverse section, proves it to be generically allied to the *D. biporcatus*.

Fig. 1.

In the *Dendrodus strigatus* the central system of reticulate medullary canals occupies a larger proportion of the mass of the tooth. The radiated canals or processes of the pulp are shorter and more branched: the systems of calcigerous tubes which diverge from the numerous processes and branches are separated from each other by a fine and clear line, and terminate in a broader band of calcigerous cells. The appearances which the structure of the tooths thus present in the transverse section, somewhat resemble those of the tooth of *Myliobates*; but the lobes or systems of calcigerous tubes are less regular in form and size.

Fig. 2.

Dendrodus sigmoideus.

A third tooth, long, slender, and cylindrical, differs from the preceding in having a smooth surface. It is also bent in a sigmoid curve (fig. 2, *a* and *b*, are transverse sections of the parts they are opposite.)

A fourth tooth, the *D. compressus*, presented a more compressed conical figure than the two preceding, and the opposite ridges, which characterize the *D. biporcatus*,* here form, as it were, the margins of two

* The characteristic ridges of this tooth are shown in Fig. 5. They were not expressed in the wood-cut of the preceding number.

cutting surfaces, and the opposite end of the flattened elliptical transverse section of the tooth. The length of this tooth is eight lines: the largest diameter of its base three lines: the shortest diameter two lines. The tooth diminishes regularly from its base to its subacute apex. The surface of the tooth is much smoother than in the *D. strigatus*. I took a transverse section from the base of this tooth, and finding the same essential radiated structure, and dendritic ramifications of the medullary canals, I made a longitudinal section of the rest of the tooth (fig. 4.).

Fig. 3.

Dendrodus compressus.

This section exhibited eight principal medullary tubes—the four largest and closest together were situated in the centre—the others diminishing as they approach the side. The central ones run parallel to each other, and to the axis of the tooth along the basal half; the two middle so continuing to the apex. The small lateral tubes bend outwards to the side of the tooth—the third on each side sends off one or two primary branches in the same oblique direction — and also finally terminates by bending towards the margin of the tooth.

Fig. 4.

The primary divisions of the large medullary tubes run parallel, or nearly so, to the trunks, but begin slightly to diverge as they approach the apex of the tooth. The primary divisions of the small lateral tubes are given off at different angles, but always acute. The smaller or secondary branches are given off frequently at right angles, and those from the primary branches sometimes retrograde to the main tubes. The plan of branching of the whole system of medullary canals which pervades the entire substance of the tooth is strikingly similar to that of certain forest trees, as the elm, but, with this characteristic difference, which distinguishes in this, as in most other cases, the branching of an animal from a vegetable structure, namely, that the terminal branches anastomose, forming a coarse but elegant net-work, occupying with considerable regularity the whole of the interspaces of the longitudinal medullary tubes.

A transverse section of this tooth exhibits three-fourths of its central part occupied by a reticulo-medullary structure; and the peripheral portion traversed by medullary rays. In the central structure are seen the area of numerous nearly equal-sized and equi-distant medullary canals, around which the dentine is disposed in well marked concentric layers, and from which the calcigerous tubes radiate, as in the *Myliobates* and *Orycteropus;* but these tubes are relatively fewer and less parallel in their course, and form more decided reticulations in that course. The shape of each component denticle, thus seen in a transverse section, is more rounded and less regular, than in either of the two above cited instances. The cellular cement, which separates each denticle, is relatively thicker. The diameter of the central medullary canal is equal to two-thirds of the diameter of the laminated and tubular wall of the denticle, of which it forms the axis. In the peripheral structure the radiated trunks are shorter in comparison with the central cellular part. They are relatively wider apart from each other, and are less parallel in their course. Their primary divisions diverge at a more open angle, and their lateral branches are longer.

Fig. 5.

Dendrodus biporcatus.

The branches of the radiating canals, after dichotomising, are resolved at their extremities into radiated systems of calcigerous tubes, terminating in a thin stratum of calcigerous cells. This stratum forms the boundary of each system, and thus describes an undulating line on each side of the radiated canals, which is very similar to the anfractuous inflected layer of the external cement in the *Labyrinthodon*. In the transverse section of the *D. compressus* the calcigerous tubes seem to form, towards their extremities, a fine net-work with open meshes, and to be fewer, and a greater relative distance from each other than in the first described species.

It is obvious that the plan of the structure, as exhibited in the longitudinal section of the tooth of the *Dendrodus*, bears considerable analogy to that in the Shark, and in the Scomberoid fishes, as in the *Sphryæna*, *Dictyodus*, *&c.;* but one cannot fail to recognize a greater amount of parallelism in the medullary tubes in the *Dendrodus;* and the systems of calcigerous tubes which diverge from the medullary canals, still more strikingly exhibit the difference which depends upon their straighter and more parallel course, and which indicates the higher type of structure in the *Dendrodus*. These tubes, in fact, instead of forming the inex-

tricable moss-like reticulations which occupy the median spaces of the medullary canals in the Shark, here run at right angles to the sides of the tube from which they are continued, and parallel to each other, as far as the middle of the interspace, and there meeting in the extremities of the opposite series of calcigerous tubes, are lost in minute cells.

VI.—OBSERVATIONS ON INFUSORIA.

By Professor Ehrenberg.

On the influence of a low temperature on the Infusoria.—The researches of Ehrenberg agree with those of Spallanzani, and prove that cold is generally fatal to Infusoria, especially to the *Rotatoriæ*. It is even more destructive to the living animals than to the eggs; but water when recently thawed may be found inhabited by individuals which have escaped death, and enclose the germs of future generations. The animals generally die after they have been encased in ice from one hour and a quarter to two hours; but it appears that at the moment when congelation of the water takes place, each animalcule is surrounded by a small cavity, which seems to be the result of its proper heat. A sudden thaw always produces a fatal effect on the Infusoria. They are found in winter at the lower surface of ice, covering ponds, &c.

Heat instantaneously kills infusory animalcules: the eggs and the animals equally perish. Several species are, nevertheless, capable of supporting a temperature from 45 to 50 degrees (Reaumur?). This heat is less hurtful when it takes place gradually.

Light is favourable to their production, but it is not absolutely necessary; for they are even found in deep mines: such for example as Schlangenberg, Fribourg, &c. Too strong a light is unfavourable. The infusoria are sometimes found in waters towards the north; but a particular circumstance might influence them in this situation. Heat causes the developement of currents of gases which draw with them the Infusoria; so that they are more frequently found on the warm side, than on the side towards the light. The difference between day and night is not appreciated by the Infusoria.

The *electric spark* acts differently, according to the power and the species on which it is tried; generally the animals found in the current are dead, if not by the first spark, at least by the second. The animals found in the current of the galvanic pile, or of a magneto-electrical

apparatus, are instantly killed; but to effect this, it is necessary that decomposition of the water takes place, and that the wires be approximated to within from one to three lines of each other. All animalcules which approach are as it were struck with lightning.

Atmospheric air is necessary for the existence of Infusoria, and especially the *Rotatoriæ;* it is, therefore requisite that a small hole be cut in the cork of the bottle in which they are kept. The smaller species very soon die; those of the genus *Chlamidomonas* live five days under a layer of oil. The Infusoria can only live beneath the air-pump as long as there is a small quantity of air; the larger animalcules soon perish, when thus treated.

Oxygen produces but little effect on Infusoria. A small proportion of *Nitrogen* added to atmospheric air, and transferred to a vessel containing Infusoria, caused them to die after twenty days; and a small proportion of *Hydrogen* similarly added, killed them after seventeen hours.

All *Chemical substances,* which do not change the composition of the water, exercise no influence over the Infusoria; not even the strongest poisons, if they are not more than mechanically mixed with it. The fresh water Infusoria are killed by a drop of sea-water, which, however, contains a large quantity of Infusoria. *Strychnia* destroys them, in the same manner as putrid water, by promoting an expansion. *Rhubarb* is swallowed without producing any effect. *Arsenic* was swallowed by *Hydatina senta,* but which animalcule did not die until some time after. *Calomel, Corrosive sublimate,* and *Camphor,* did not cause death until after some hours. *Wine* and *rum,* like *sugar,* destroy many of the Infusoria, which are found in drinkable water. — *Mandl Traité Pratique du Microscope, p.* 427, 1839.

VII.—ON THE SOURCE AND MODE OF OBTAINING MICROSCOPIC SHELLS, &c.

*By J. S. Bowerbank, Esq. F.G.S. &c.**

THE minute Foraminifera, and other shells and remains, found in such abundance in the sands in which the Grignon and other Calcaire Grossière shells are embedded, have long furnished an interesting series of

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* In a Letter to the Editor.

objects to the lovers of microscopic research. Similar minute and beautiful objects have of late years been found to abound in some parts of the Suffolk crag, and very recently they have been found, but more sparingly, in the London clay; and especially in the sandy beds of that formation at Bracklesham Bay, in Sussex. Ehrenberg has figured similar beautiful little fossils from the chalk formation of England; and they have also been observed in great profusion attached to the under surface of tubular flint, and embedded in the mass of the greater number of the tuberous nodules of flint in the upper beds of the chalk; and they are likewise found in the chests of the green-sand formations, and in many other similar silicious masses. The wide distribution of these highly interesting and beautiful little fossils, and the facility with which they can be obtained, renders it exceedingly desirable that they should be carefully and systematically examined and compared with the recent shells of the same families; and it is in the hope that some of your numerous scientific friends may be induced to undertake so pleasing a task, that I have troubled you with these few lines, to point out an easily, accessible, and very abundant source for procuring recent minute shells of a similar description.

If the sand and dust shaken out of the West Indian sponges into the bins or casks in which they are kept by the large dealers in sponge, be swept up and examined, it will be found to abound in minute shells, corals, and other interesting remains of marine animals; and among them many specimens of *Foraminifera, &c.* are found, which appear, from the hasty examination that I have bestowed upon them, to approach very closely indeed to many specimens of the same family that I have seen in the fossil state. Species of Echini, spicula of sponges, and an infinite variety of minute organic remains will reward the researches of the observer. The sponges themselves, in the state in which they are imported, are also well worth the trouble of a careful examination, especially those parts that are usually trimmed from the base as being too full of impurities to be sold; many very beautiful specimens are thus found attached to the fibres of the sponge. I have not found many organic remains in the sand shaken out of the Turkey sponges; but it is probable that if the sand from such sponges, obtained from other localities, were to be carefully looked over, new and interesting subjects would be the result of such an investigation.

[It may be interesting to observe, that the Foraminifera appear to be very generally distributed both in a recent and fossil state. The small quantity of sand contained in almost every marine shell, &c., will, on careful examination, be found to afford a variety of the objects mentioned above.]—*Editor.*

VIII.—ON THE MEANS OF PREVENTING TREMOR IN MICROSCOPES*

By Mr. Andrew Ross.

It would be needless here to insist upon the importance of *steadiness*, or perfect freedom from vibration, for the successful prosecution of Microscopic observations. Numberless contrivances have been resorted to for the purpose, the most successful of which, is probably the use of a very large mass of stone or metal as a support for the instrument. But the necessary weight of such a mass, involves inconveniences which quite prevented its general adoption, and have led to the application of expedients, which, without entirely destroying the vibrations, should render them as little injurious as possible. I may mention as one tolerable arrangement of this sort, my own mode of supporting the compound body on a bar, which, together with the stage, form one solid casting, so that the vibrations, which in this case take place principally from the joint, affect the body and the stage as nearly similar as possible, and produce an effect certainly much less prejudicial, than when the compound body, supported only at its lower extremity, vibrates not only to a much greater extent, but independently of the stage. As, however, all the expedients hitherto resorted to are either imperfect, or nearly impracticable, I was induced to make a series of experiments, with the details of which I will not trouble the Society, but will merely describe, that, which after many trials and modifications I have found to be the most successful.

The principles it seems to demand are—

1st. That a very large proportion of the weight of the instrument (say nine-tenths or thereabout) be supported upon springs.

2nd. That the remaining one-tenth or thereabout be supported upon soft felt, or other fibrous substance.†

3rd. That the attachment of the springs be such as to *suspend* the weight, because if supported by placing the springs underneath the weight, lateral stays would be required, and through these, vibrations in the plane of the table might be transmitted to the instrument.

One method of applying these principles is by the apparatus shown

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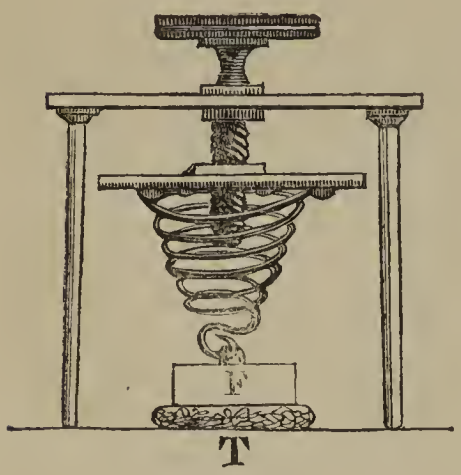
* Read at the Microscopical Society of London, 1840.

† India rubber would probably answer the purpose better than felt.—*Editor.*

in the annexed diagram, one of which is to be applied to each foot of the Microscope. T represents the table upon which the instrument stands; F the end of one of the feet of the Microscope; the part between T and F the felt or other fibrous substance. A hook is shown at the end of the spiral spring, and another hook in the foot of the Microscope, by which the spring and instrument are connected. The other end of the spring is fastened to the plate into which the screw acts. This screw is supported by the plate above, and again this plate is supported by three legs which stand upon the table, only two of which are shown in the diagram. The apparatus is adjusted by the nut at the top, which turns the screw and raises the plate and spring connected with it, until a sufficient quantity of the whole weight of the instrument is supported. The necessity for the screw adjustment is that, when the instrument is differently inclined, the weight varies upon the same feet; there is also a difference in the character of tremor, which requires a different adjustment of the springs, to prevent it being communicated to the Microscope; an example of this is where the tremor is produced by the rapid motion of carriages along the streets, and that produced by a person walking in a room. In the first case a great proportion of the weight must be supported by the springs, and in the latter the feet of the Microscope should have some considerable pressure upon the table.



Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1840*]

Microscopic Parasites. — As an example of minute and organised parasitical bodies destroying the living body or part upon which they grow, may be mentioned that Laurent discovered minute Fungi in the eggs of *Limax agrestis*, which by their increase completely destroyed the embryo. Ehrenberg observed the appearance of *Chætophora* (Tremella) *meteorica* upon the scales of *Salmo eperlanus*. Hanover has described the growth of Conferva upon the toes of *Triton punctatus*, and Henle has observed parasitical Infusoria upon the same animal. According to this observer the parasitical ani-

* Translated and communicated by Dr. W. H. Willshire.

malcules were species of *Vorticella*. Schönlein saw the growth of Fungi in the pustules of *Porrigo lupinosa;* and Langenbeck noticed the developement of highly organised members of this division of the vegetable kingdom, in the body of a person who had sunk under typhoid fever.

Microscopic Plants in Snow.—Several new microscopic forms have been described by Thienemann as existing in snow. This author has described a new genus of plants allied to the Byssoid and Leptomyoid Algæ, the characters of which are :—*Filis liberis, articulatis, dichotomis, dense sibi implicitis, in nivis superficie crescentibus, apice sporis valde intumescente sicco statu capitulum formante.*

The species (3) of this genus appear at first as minute, and for the most part agglomerated vesicules, showing under the greatest magnifying powers a coat composed of a single layer. These vesicules, which are completely spherical at first, assume an oval shape at a later period, and an active molecular movement of hitherto unobserved particles, with a separation of the coat into two layers is seen. As this molecular movement goes on internally, the inner layer of the coat separates into two portions, which at the same time extend themselves longitudinally, the moving particles of the interior now ceasing to be visible. The molecular movement again commences along with a new division of the previously separated portions, which as before increase longitudinally. At a later period, however, the terminal cells alone divide, the central ones increasing in size, and soon after which longitudinal division is seen to take place. At last an active molecular motion is visible within one of the terminal cellules, the molecules gradually increase in size, the terminal cellule expands, which, when the fructification is complete, presents the appearance of a little head filled with spherical sporules.

Meteoric Paper.—The microscope has been ably employed by Ehrenberg to determine the composition of the Meteoric Paper of 1686, and which he states is a product of *Confervæ* and *Infusoria,* now existing on our globe. According to this author the substance known by the name of Meteoric Paper, and which fell near Rauden, in Curland, in 1686, is formed of filaments of *Conferva crispata,* thickly matted together, with remains of a Nostoc, twenty-nine well preserved species of Infusoria, and the cases of *Daphina pulex.* Of the twenty-nine Infusoria eight only have silicious *Loricæ,* the rest have soft coverings. In the Meteoric paper of Schwazenberg, Ehrenberg found *Conferva capillaris, C. punctalis,* and *Oscillatoria limosa,* along with twenty distinct species of Infusoria, &c. In a mass found in Sweden, *Œdogonium vesicatum,* (Link) Infusoria, and the *pollen* of some Coniferæ were discovered.

Growth of Hair.—M. Mandl is inclined from some phenomena which he has observed in the growth of hair, to arrive at a different conclusion relative to this process from that generally received. He states that, in individuals who have had their hair recently cut, each hair preserves its

diameter to its free end which presents a truncated extremity, where the eye may distinguish the section both of the cortical part, and that of the internal canal. But if these same hairs are examined after a long interval, each hair is found to be terminated by a pointed extremity, more or less long, but with its extremity closed. This change of form M. Mandl considers to be the result of a vital process, and as proving the possibility of a movement of fluids in the interior of the hairs. He thinks this opinion is still further supported by the fact, that when hair is kept long, instead of the formation of a pointed extremity, obliteration of the extremity of the canal alone takes place, which he supposes to be caused in all probability by the difficulty of the movements of the fluids.—*Amer. Jour. Med. Science. Transl. from Comptes Rendus,* 1840.

Remarks on M. Mandl's observations, by Mr. George Busk.—This opinion is perhaps still further corroborated, when we consider the strict analogy between hairs and feathers. A quill may in fact be considered as a large hair, and no one doubts a continued power of development in feathers until they have reached the full size. This continued growth, must be attended with circulation of fluid—probably like that in the cells of plants. No hair of any animal is a simple tube, but the interior of all is cellular, like the interior of a quill. The cells in most hairs are irregular, but in some they are remarkably regular in size and distribution, among which may be specified the fine hairs of all Rodents, and of many other animals, as the mole, ornithorynchus and others. In this class of hair the colouring matter is confined strictly to the cells. The growth of the beautiful hairs of the bat tribe, can hardly be explained without allowing them an independent power of developement.

It is difficult in many hairs to demonstrate the cellular nature of the internal structure; and the opinion that the human hair is a simple tube, has, we should be disposed to imagine, arisen from optical deception. We have seen a hair taken from the chin of a native of New Zealand, whose face was closely tattooed, and which hair was of a bright blue colour, from its having taken up some of the colouring matter used in tattooing. Under the microscope this hair showed the cellular structure very distinctly; it was rendered manifest by the colour. In hairs, whose cellular structure is not regular, the colour appears to pervade all parts of the hair; from which we may probably conclude that the regular colour-cells, in the fine hair of Rodents and others, are more analagous to the cells of adipose tissue, and are specifically intended for the secretion and retention of the colouring matter.

[*From Oken's Isis,* 1839.]*

Dujardin on Microscopic Insects.—This observer had previously shown, that the *Rhizopoda* have no skin, at least on a portion of their surface; but that they possess a soft, glutinous substance, capable of extending itself into moveable threads. In October, 1839, he dis-

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* Translated and communicated by Mr. G. F. Richardson.

covered in the Seine an animalcule of this kind which he names *Gromia fluviatilis*. It consists of a round skinny sac one-third of a millimeter in thickness, filled with a glutinous substance of homogeneous nature, intermingled with thicker grains, and perforated with an aperture from which the animalcule protrudes branched threads, with which it creeps on water-plants. These threads are remarkable for the frame-works of the skin (Spannhäute) between every branch, which indicate the absence of the skin on these threads.

He further remarked an appearance of life in the embryo of *Distoma cygnoides* from the bladder of the frog. The native eggs are $\frac{1}{22}$ of a millimeter in length, and exhibit an embryo $\frac{1}{4}$ less in size which every moment changes its form and situation by means of glittering ciliæ, which cover its surface. This analogy of the embryo with the ciliated infusoria, such as *Leucophrys* is the more striking, since the *Distomata* at maturity have no trace of ciliæ.

He has also communicated some new observations on the spermatic animalcules of the carp. When taken from the semen they are mere round immoveable globules $\frac{1}{400}$ of a millimeter in size. When placed in water they immediately move very rapidly, become one-fourth larger, and exhibit a thread which they agitate like a tail. In the course of five minutes their motion becomes weaker, their diameter is increased to $\frac{1}{270}$ of a millimeter, the tail becomes curved, and almost wholly coiled up; at the end of ten minutes the diameter is $\frac{1}{250}$th, and of an hour $\frac{1}{200}$th. After some time they disappear altogether.

Turpin on the Globules of Milk.—They vegetate and nourish themselves in this substance exactly like the globules of the blood, the lymph or nervous mass, or the bulbs of the hair; in short, like all those elementary organisms, of which the organic structure consists, and which derive their support from the surrounding slimy fluid. They are composed of two vesicles, and contain smaller globules, together with oil producing a greasy substance; their size extends to $\frac{1}{100}$th of a millimeter; when exposed to some degree of warmth they become four times this size and then burst. They still vegetate in an independent manner, as the outer skin breaks, and pushes out the inner branches, which become entangled like the axes of potatoes germinating in a darkened cellar. They at length become *Penicillum glaucum*, and plant themselves by means of buds and seeds, particularly on the surface of milk, of cream, and of cheese. If the globules are placed between two glasses with a little water they soon germinate, and change to the *Penicillum glaucum*, which radiates on all sides and bears fruit. They may be persevered in this manner for a whole year. The sleep-apples (Schlaffäpfel) of the rose, the excrescences of which, under the name of *Erineum*, were conceived to be fungi, are no more independent plants, than the hairs of animals are independent creatures. If, however, in the one case the cells, and in the other the bulbs of the hair, did not come forth till after the death of the body, we should consider them as independent plants. This is the case with the globules of milk. What then can a portion of organic matter be said to be? Nothing but a mass of innumerable globules endowed with vital energies, which

only wait a favourable opportunity to develope themselves. The leaven of bread, according to Cagnard Latour, is nothing but a similar mass of globules. I, therefore, perceive no difference between the globules of milk, and the cells of animals and of plants, which are prolonged into hairs. Additional proofs are thus constantly afforded of the principle which I announced in my work published in 1805, under the title of Procreation, that an organic body consists of nothing more than a mass of Infusoria, and that procreation is nothing more than the aggregation of Infusoria, spermatic animalcules of which do not naturally consist of defined species, but of simple vesicles or slime.

Meyen.—The spermatic amimalcules of *Liverworts* and *Mosses* have tails like those of animals, and develope themselves singly in the grains of pollen, and also in the *Chara*. The globules are only cells of slime in which the animalcule forms itself. The cell then disappears, and the animalcules lie curled in a spiral form in the thread of pollen, which bursts in water, and releases the animalcule. They at first cling by their long tail to the thread, but subsequently swim about freely and quickly. In *Marchantia Polymorpha* a single animalcule proceeds from every cell of pollen mass. In *Hypnum argenteum* the masses of pollen adhere for a long time to each other. A. Von Humboldt and J. Muller have seen their motions They are those of true Infusoria, and not like those of the Molecules of Robert Brown.

Elie de Beaumont.—The Tripoli of Bilin in Bohemia is a tertiary bed situated on a hill, the base of which is Pläner Kalk, or Tuffkreide, on which are deposited four beds.

1st. Clay some metres in thickness.

2nd. White Tripoli four metres, in which Fischer and Ehrenberg have found Infusoria.

3rd. Yellow loam four metres.

4th. A Bed of semi-opal in thin laminæ and friable.

Turpin has examined such friable semi-opals, and found but few organic remains ; some yellow globules of *Protococcus*, with others blackish and striped like the eggs of Infusoria ; some organic threads, and the foot of an insect, probably *Acarus*. This is by no means singular, since, during their deposition from water, organic remains might easily be introduced.

On Animalcules contained in Chara.—Thuret has observed in the interior of the Anthers (globules) of *Chara vulgaris* and *C. Hispida*, flexuose, transparent, chambered filaments of unequal length, in which are contained animalcules at first motionless, but after a time they move and struggle to release themselves from their prison. In this they do not always succeed, although their twisted position attests the efforts made for disengagement. They appeared like a spirally-rolled thread of three to five curves, with two appendages, bristles, or tentacula of excessive tenuity, which the animalcule incessantly agitates with great rapidity.—*Abridged from Ann. des Scien. Nat. Vol. XIV. p.* 65.

Observations on the particular Appendages of the Caudicula in the Sexual Apparatus of Orchideæ, and in several species of the tribe of Vandeæ, by M. Mutel.—The distinctive character of the tribe *Vandeæ* is the presence of the *Caudicula,* whose office is to bind the pollen masses to the gland of the stigma. This Caudicula, examined with care, offers particular appendages, which are the true ligaments serving to hold the masses of pollen on the Caudicula. These ligaments, most frequently very short, and rarely more than one or two in number, are sometimes simple, sometimes bifid, or two-lobed, sometimes much developed, sometimes scarcely distinct, and nearly always of another colour, or at least of a different tint to the Caudicula. They are generally entirely lodged in the interior of the pollen masses, or in their furrows, when such exists; or further they are surrounded by their approximated bases, so that they are always invisible when they are in their situation. But when the masses are gently dispersed, the ligaments may be seen to become by degrees disengaged and elongate considerably, until the moment of the separation of the masses, and thus having become free at the summit they suddenly shorten, and remain at the summit of the Caudicula of a variable shape, but constant in each genus, and as they have marked diversities of form in different genera, I have given them the name of *freniculæ* (frenicules) to these ligaments, as independent of their particular form, and indicating their special use. These *freniculæ* form, according to their nature, colour, elasticity, and state, the passage of the masses of pollen to the Caudicula. In the case of the bifid, or two-lobed state of the *freniculæ,* they separate into two distinct branches, each of which then holds a mass of pollen.—*Comptes Rendus,* 17 *Aug.* 1840.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

March 17th, 1841.—*George Loddiges, Esq. F.L.S. in the Chair.*

Dr. John Lee, Mr. Thomas Law Wheeler, and Mr. H. White, were proposed as members.

A paper was read from Mr. George Busk, Surgeon to the S.H.S. Dreadnought, being "Observations on the Structure of *Tricocephalus dispar.*" This communication will be inserted entire in our next.

The Chairman stated that, owing to the increasing number of specimens and books recently acquired by the Society, the Council considered it necessary to appoint an office of Honorary Curator and Librarian; and they were happy to be able to recommend Mr. John Quekett, a gentleman they considered eminently qualified to fill the office. The recommendation on being submitted to the Meeting was carried unanimously.

It was also stated that the Report read at the First Anniversary Meeting, together with the President's Address, had been printed, and was ready for distribution.

The Meeting then resolved into the usual Microscopic Illustration and Conversazione.

Microscopical Memoranda.

The late Francis Bauer, Esq.—Mr. Bauer continued, up to a late period, his microscopic researches and drawings; but unwilling to risk the chance of leaving any work unfinished, he at last determined to rest, and to attempt no more. Seated near his microscope, which long use had made almost essential to his happiness, he spent his hours, in re-examining what his pencil had so admirable perpetuated, and reviewed, in the monuments of his labour, the history of his life. Mr. Bauer was born at Feldsberg, in Austria, on the 4th of October, 1758, and died at Kew on the 11th December, 1840.—*Athenæum.*

Circulation of Vallisneria.—In the majority, and probably in all the cells of *Vallisneria*, it may be noticed, that, besides the green granules hitherto observed to circulate, I have distinctly seen a much larger *transparent colourless body*, varying in size, which moves with the green granules, several of them usually adhering to it. This body may probably be considered as a rudimentary cell, developed upon one of the green granules as its cytoblast. It may likewise be stated, that, this appearance is only to be defined with the achromatic condenser (*eclairage*), and has doubtless been overlooked from want of attention to the management of the light.—*Mr. George Busk, Surgeon, &c.*

Guyon on living Worms under the Conjunctiva—Blot of Martinique, has, like Bajon of Cayenne, and Mongin of St. Domingo, seen two worms in active motion under the conjunctiva, which he removed by incision. One of these which was sent to M. Blainville, was thread shaped, thirty-eight millimeters long, with a black protuberance adapted for suction.—*Dublin Journal, &c.*

On mounting Opaque Objects.—The plan usually adopted of mounting opaque objects on dead black paper, is objectionable on account of the small fibres on the surface of the paper reflecting some considerable portion of light. The plan best adapted for mounting minute objects to be viewed either opaque or transparent, is simply by placing them on a piece of crown glass with a little weak gum-water, and surrounding them to the extent of a quarter of an inch or more with a rim of cardboard sufficiently thick to prevent the object being removed or broken, when another slide is placed intentionally or otherwise upon it. By using the *stop* the object is made opaque, and an even and uniform dark-coloured field is by this means obtained.—*Editor.*

On the structure of Normal and Adventitious Bone.—Mr. Alfred Smee found on examining, by means of a microscope, very thin sections of bone, prepared in a peculiar manner, a number of small, irregularly-shaped, oblong corpuscles, arranged in circular layers round the canals of Havers, and also rows of similar bodies distributed around both the external and the internal margins of the bone. Each corpuscle is connected by numerous filaments, passing in all directions with the Haversian canals and the margins of the bone, and also with the adjacent corpuscles. He finds that the canals of Havers are vascular tubes con-

taining blood. The corpuscles themselves are hollow, and their cavities occasionally communicate with those of the canals; their length is equal to about two or three diameters of the globules of the blood. They exist in cartilaginous as well as osseous structures, and are found in every instance of adventitious bone, such as callus after fracture, morbid ossific growths either from bone or from other tissues; and the author has also ascertained their presence in the bony and cartilaginous structures of inferior animals, such as birds and fishes. Measurements relating to these corpuscles, by Mr. Bowerbank, are subjoined, from which it appears that their diameters vary from about the 10,000th to the 4,000th, and their lengths from the 2,300th to the 1,400th part of an inch.—*Proc. Roy. Soc. Jan.* 23, 1840.

Infusorial Animalcules in Red Snow.—Mr. Shuttleworth relates, that being occupied in the examination of some red snow that fell at the Grimsel, and expecting to see only inanimate globules of *Protococcus nivalis*, he was astonished to find, that it was composed of organized bodies distinct in nature and form, partly vegetable, but the greater number endowed with the liveliest powers of motion, and belonging to the animal kingdom. Among these he named one species *Astasia*, (Ehrenb.) *nivalis*, and another *Gyges sanguineus*.—*Bibl. Univ.* (*Ann. Nat. Hist. Vol. V.*)

Notes on the Parasites of Birds, by Mr. Charles Ager.—Whilst engaged in making microscopical preparations for the late Tweedy John Todd, M.D., of Brighton, (1500 of which have been purchased by the Royal College of Surgeons), I made a collection of the Parasites of a considerable number of British birds, and shall be happy to furnish, from time to time, drawings and observations on their structure, presuming that, as little has appeared on the subject, it may not be uninteresting.

The external forms of many of them are very curious, and their organization (which in the microscopical preparations, I have been enabled by a *peculiar process* to develope very satisfactory) is very complex, especially their respiratory system (*tracheæ*), beautiful ramifications of which may be traced into every part of the body, even down to the claws.

In many instances the male and female differ very much in form; and several birds which I have examined had two distinct kinds, differing altogether from each other, both in form and size. Their relative sizes, in regard to that of the bird they infest, is also curious; as in those of the house-marten and swallow. The Parasite of the latter bird, although the larger of the two, is not bigger than the cheese-mite, while that of the former is as large as the sheep-tick, measuring fully a quarter of an inch in length, and is something like the latter Parasite in form; excepting that the marten's Parasite has appendages like wings, being the only instance I have met with. It generally lodges itself on the neck of the bird, and adheres with great firmness to the feathers, which is not surprising when we see it provided with such powerful claws. Indeed the most minute kinds are well provided in

this respect, as, besides a double, and sometimes as in that of the marten a triple claw, many of them are furnished with a patella, similar to that of the *Dytiscus marginalis*.

In many of them the legs are set horizontally with the body, and have only a lateral motion, so that although they are enabled to make their way very quickly amongst the feathers, they cannot make the least progress, when laid on a smooth surface; others when set on the smoothest surface run very swiftly.

[The sketches, which accompanied this communication, on examination were not found to be new or undescribed; and as figures have appeared of them in other works, we have not thought it advisable to give them. The Parasite obtained from the house-marten alluded to above is *Stenypteryx Hirundinis*, a Dipterous insect. That of the swallow belonged to the Apterous order, *Chelytus ?—Editor.*]

Observations on the Blood-corpuscles of certain species of the Genus Cervus.—Mr. George Gulliver, has found that the blood of the Muntjac (*Cervus Reevesii*), the Porcine (*C. Porcinus*), and the Mexican Deer (*C. Mexicanus*), contains, together with corpuscles of the ordinary circular form, a still larger number of particles of less regular shape; some curved and gibbous in the middle, and acutely pointed at the ends, with a concave and convex margin, like a crescent; others approaching more nearly to segments of a circle; some shaped like a comma, being obtuse at one end and terminated by a pointed curve at the other; others having an acute projection of the convex part, so as to constitute a triangular, or even quadrangular outline; some having the figure of the head of a lance; while a few presented a double or sigmoid flexure, as if they had been twisted half round at the middle. Like the ordinary blood-discs, these peculiar corpuscles are deprived of their colouring matter by water; but with only a small quantity of water they quickly swell out, and assume an oval or circular figure, forming long beard-like strings by the approximation of their edges. In saline solutions they become rather smaller, but preserve their figure tolerably well.—*Proc. Roy. Soc. Feb.* 6, 1840.

Microscopical Society's Cabinet of Objects.—It may not be generally known to our readers, that the Microscopical Society of London is desirous of forming collections of interesting objects for reference, and that Mr. John Quekett has been appointed the Curator, to whose care their arrangement, &c. is entrusted. Some months since the Council decided upon two sizes for the glasses on which the objects presented to the Society's Cabinet should be as far as practicable mounted; they are as follow: — *Three inches* by *one inch* — and *three inches* by *one and a half inches*. For the convenience of members a cutting-board and diamond is kept in the charge of the Curator, the property of the Society, which may be made use of by Members on application.—*Editor.*

IX.—OBSERVATIONS ON THE ANATOMY OF THE TRICOCEPHALUS DISPAR.*

By George Busk, Esq., Surgeon to the Hospital Ship Dreadnought.

It is not the intention of this paper to enter into a detailed account of the anatomy of this common entozoon, which has been correctly described in most respects by preceding observers, but merely to direct the attention of those interested in the subject to some points in which all Helminthologists, so far as I am aware, have erred.†

The form of the worm, as is well known, consists of a long, slender, anterior portion, and a thick and shorter posterior part, which in the female is slightly curved, but in the male coiled in the same plane. The visible organs comprise, a digestive and generative apparatus, the true arrangement of which latter it is the principal object of this paper to elucidate—but I will, previously, briefly describe the former.

The mouth, small and orbicular, communicates with a narrow, straight, and very short œsophagus, terminating in a sacculated or moniliform intestinal tube, which occupies the whole length of the filiform part of the body—in the centre of which it lies, supported in its position by narrow filamentous bands, passing from it at regular intervals to the external parietes of the worm. At the junction of the thick with the slender portion of the body, this sacculated intestine terminates, by opening into the dilated commencement of that part of the digestive tube which is situated in the thick part of the body, and which part of the tube differs very materially from the sacculated portion just described, and it may, probably, be considered as the large intestine. It may at all events be conveniently and properly divided into three portions, under the names of cæcum, colon, and rectum.

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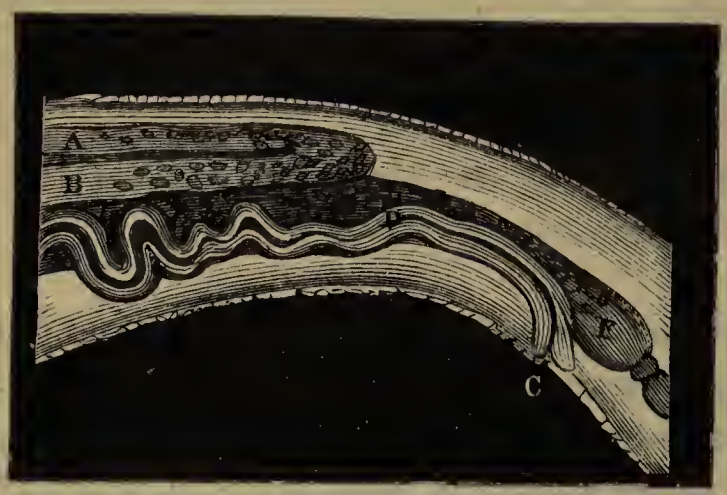
* Read at the Microscopical Society of London, March 17, 1841, and communicated by the Author.

† Since this paper was read, the Author has found on referring to the Versuch einer Naturgeschichte der Eingeweidwürmer, von J. A. Goeze, 1787, p. 116, tab. vi, fig. 4, that the vulva and external oviduct are accurately described and figured by that writer; a fact which makes it the more remarkable that this arrangement should have been overlooked by succeeding observers.

The cæcum, E, fig. 1, is the dilated commencement of the large intestine, and though differing in shape in different individuals, is usually quite distinct from the succeeding colon, with which it joins, at an abrupt angle. The colon, which nearly corresponds in length with the thick part of the body, is nearly straight, and of uniform diameter, never sacculated, or moniliform. It is usually much overlapped by the generative apparatus, but is not surrounded or entwined by that tube. Within a short distance of the posterior extremity of the worm, the colon terminates in a narrow, straight, contracted tube, which may be considered as the rectum, D, fig. 2. The colon gradually tapers into the rectum, and in this tapering part the internal surface presents a striated appearance, as if it were furnished with cilia, which are absent in the rectum, and are not visible in any other part of the intestine. The interior of the cæcum is covered with rounded folds. The walls of the rectum are thick, and probably muscular, and this part of the intestine may occasionally be seen to move, so as to become straighter, long after all other evidence of life is extinct in the animal. The anus is in the form of a narrow fissure, with two prominent labia, one of which projects beyond the other; and at this part the continuity of the integuments of the worm, with the walls of the rectum, may be readily seen.

Fig. 1.



The generative apparatus in the female, consists of a long tube, which may be divided in four parts, and considered, as an ovary, an internal oviduct, or Fallopian tube, a uterus, and an external oviduct and vagina.

Fig. 2.

The ovary commences (as at A, fig. 2) with a closed, and generally somewhat pointed extremity, close to the rectum, with which it is in apposition, but to which it does not appear to be attached, as it does not follow

the movements of that intestine, in those instances in which the latter may be observed to move. From this point the ovary proceeds forwards, in the form of a serpentine tube, as far as the anterior part of the thick portion of the body, where it ends in a blunted extremity from which the internal oviduct arises. This tube, which is much narrower than the preceding, passes backwards in a nearly straight course, to the posterior extremity of the body, where, after making one or more turns around the rectum, and passing a little forwards, it ends in the usually rounded and dilated commencement of the uterus.—(C, fig. 2.) The uterus is by far the widest portion of the generative tube, and when full of ova occupies the greater part of the body of the worm. It is much dilated and straight, and terminates anteriorly in the external oviduct, which is a narrow tortuous tube, with very thick and apparently firm walls. It first makes several convolutions, (D, fig. 1) and becoming nearly straight, finally opens in the surface of the body by the vulva.—(E, fig. 1.) This opening is situated nearly at the junction of the filamentous and thick portions of the body, and, consequently, in situation nearly corresponds to the entrance of the moniliform intestine into the cæcum. The form of the orifice is various, being sometimes circular, and sometimes that of a transverse fissure, with one continuous, or two much elevated labia. The surface of these labia resembles exactly that of the sheath of the male spiculum, being, like that, covered with acuminated papillæ. From this opening the ova can be readily expressed:—enveloped in, and slightly attached to each other by a viscid mucus, containing minute granular particles. The ova, when thus emitted, resemble very much the cysts of the *Trichina spiralis*, having like them thickened and elongated extremities. No distinct embryo, however, can be seen within them, as can be done, according to some writers, in the ova of *Strongylus*, *Ascaris*, and other nematoid worms. The ova assume their last covering and elongated form in the anterior part of the uterus. In the other portions of the generative tube they are rounded, and have a very thin, indistinct capsule.

In the male *Tricocephalus*, the arrangement of parts is very similar to that in the female, except that as the seminal outlet in the male is situated in the posterior extremity of the body, there is no occasion for a tube corresponding to the internal oviduct, or Fallopian tube. The generative apparatus in the male consists of a tortuous, tubular testicle, which resembles in size, shape, and situation, the ovary of the female; commencing like it by a narrow blind extremity near the rectum, whence it passes forwards, and in the anterior part of the thick portion of the body turns backwards, and becomes continuous with a straight

dilated, seminal receptacle, or as it may be termed, vas deferens, corresponding to the uterus. Before making this turn, however, the testicular tube may in some instances be observed to become dilated into a small pouch. The vas deferens, or seminal receptacle, occupies nearly the whole length of the thick body, which it also nearly fills. It is usually constricted in several places at irregular intervals, shewing the presence probably of circular, muscular fibres, and it finally terminates towards the posterior extremity of the body, in a narrow straight canal in which the spiculum is lodged.

From this account it follows, that—

1st. The *Tricocephalus* has a distinct vulva, and that the generative and digestive tubes do not communicate at a cloaca, nor terminate at a common orifice, as described by most writers on the subject.

2nd. That in the presence and situation of the vulva, this entozoon obviously very closely resembles the *Strongylus*, and most other nematoid worms; and thus an apparent great anomaly in the arrangement of this class is removed.

3rd. That the alimentary canal is not so simple as is commonly supposed.

4th. That the *Tricocephalus* is in all probability simply oviparous, and that the ova become perfectly formed only a short distance from the orifice, perhaps from being, there only, within reach of the male fluid.

I may, perhaps, be allowed to add, that considerable advantage in the examination of the interior of objects such as this worm, is gained by placing behind the object, when viewed as opaque, a silver plate not very brightly polished.

X.—ON THE OCCURRENCE OF THE ANIMALCULE OF VIBRIO TRITICI IN BLIGHTED GRAINS OF THE EARS OF WHEAT, CONSTITUTING WHAT IS TERMED EAR-COCKLE, PURPLES, OR PEPPERCORN,*

By the Rev. J. S. Henslow, M.A., F.L.S., &c. &c.

It is now just a century since Needham first made known an extraordinary fact, concerning the blighted grains found in the ears of wheat, infected by a disease known under the name of the ear-cockle, purples, or, as I find it called in this part of Suffolk (Hitcham, Bildesten), the

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* From the Journal of the Roy. Agricul. Soc. of England. Part I. Vol. II. p. 19.

peppercorn. The grains which are thus infected turn dark green at first, and ultimately nearly black; and they become rounded, somewhat resembling a small peppercorn, but with one or more deep furrows on their surface. The husks of the chaff become spread open, and the awns are twisted, by which means the infected ears are readily observable among the standing corn. Upon opening the blighted grains, they are found to be filled with a moist, white, cottony substance; but to contain no flour. When Needham placed this cottony mass in a drop of water under his microscope, he perceived to his surprise (as I did lately to mine, before I was aware that the fact had been previously noticed), that it was composed of a multitude of minute eel-shaped animalcules, which were in active movement, twisting and wriggling to and fro, like so many eels or snakes. The announcement of Needham's discovery summoned several observers into the field, of whom no one was more persevering or intelligent than Roffredi. His papers in the fifth and seventh volumes of the "Journal de Physique," contain the results of more than five years' patient investigation into the economy of these minute creatures. In the "Philosophical Transactions for the year 1823," M. Bauer has also given the result of his personal observations and experiments, carried through an equally long period, and without his having any knowledge of what Roffredi or others had already done so long before him. He has given faultless drawings of the animalcule (*Vibrio tritici*) from the state of the egg to its full growth, and, as it is seen under the highest powers of the microscope. The disease which it occasions is said to be sometimes very injurious to the wheat-crop; but I presume it must be very local, for it was unknown to some of the earlier writers on the diseases of corn, who sought for it without success; and, I could not learn, upon a limited inquiry, that it was known to the farmers near Cambridge, or at Saffron Walden. In the parish of Hitcham, Bildesten, Suffolk, however, it is well known, and my miller informs me that he often has samples of wheat much infected with it; and among what he calls the tail-corn (the last portions of a particular batch), he has found as much as half a peck in a bushel. He says also, that when the cottony mass, composed of the animalcules, is extracted from the grain in the process of grinding, it does not pass through the cloth with the fine flour in the beating, but remains behind with the bran. When a sound grain of wheat is sown by the side of one infected with the *vibrio*, the young plant which springs up from the former is not infected before March; but then the animalcules begin to find their way from the blighted grain into the earth, and thence into the young corn. They gradually

ascend within the stem till they reach the ovule (or young state of the seed) in the flower-bud, even before the ear has shown itself. Roffredi believed that they do not increase in size till they have reached the young seed, but that after this they grow very rapidly, soon deposit a large number of eggs, and then die. M. Bauer has questioned the accuracy of Roffredi's observation, and supposes the specimens found in the stem to belong to another species. The young are hatched in about eight or ten days after the eggs are laid, and speedily attain to about the $\frac{1}{33}$ of an inch in length, and the $\frac{1}{1200}$ of an inch in diameter. When full grown the *vibrio* acquires a monstrous size compared with one of the multitude which composes the cottony mass in the blighted grains, becoming a quarter of an inch long, and the $\frac{1}{80}$ of an inch in diameter. I am not aware whether any precise estimate of the numbers actually found in a single grain has ever been made, but a slight calculation will show us, that not less than fifty thousand of the young *might* be packed in a moderately-sized grain of wheat. M. Bauer seems to think that more than one generation are produced in the course of a season. The most curious circumstance which observers have noticed in the economy of this animal, and which I have had an opportunity of fully verifying, is the wonderful property it possesses of retaining its vitality under circumstances in which we should have supposed it impossible that it could have lived. If a mass of them is suffered to become so perfectly dry, that the slight touch of a hair might reduce them to powder, and they are again moistened in a drop of water, they will speedily revive, and become as active as before. They may thus be dried and revived many times before they are killed. M. Bauer states the limit to such revivals to lie between six and seven years. I happened to possess an ear of wheat infected with this disease, which had been sent me (I think) at least six years ago, but which I had not minutely examined before; and upon soaking some of the blighted grains in water for a few hours, the animalcules revived, and were quite as active as those I found in the first fresh grains, which I had been examining only two days previously. If the eggs are once dried, or even the young animalcules themselves, before they have attained a certain size, they will not revive on being moistened. It does not appear that the *vibrio* attacks any other corn than wheat; at least it has not been observed to do so. But barley, rye, oats may become infected by sowing them in the same hole with the grains of wheat which are filled with the *vibrio*. The experiment, however, succeeds with difficulty and only to a small extent. I have observed that scalding the water kills the *vibrio;* and this may suggest the possibility of exposing infected

samples to a temperature that might be sufficiently high to kill these animalcules, without being so hot as to destroy the germinating powers of the corn, and thus endeavour to prevent the occurrence of the Ear-cockle, &c.*

XI.—†REMARKS ON MR. BUSK'S OBSERVATIONS ON VALLISNERIA.

By Dr. W. H. Willshire, Lecturer on Botany, at the Charing Cross Hospital.

In reference to the communication of Mr. Busk, on Vallisneria, in the last number of the Journal, allow me to remark, that it appears to me that the existence of the phenomenon therein mentioned has been known some years. In 1837 Meyen remarked it, and in 1838, in the 2nd vol. of his Neues System der Pflanzen Physiologie, he noticed it more fully, and delineated the circumstance as existing under certain of its conditions; but I presume the first announcement of the fact will be found in the 13th vol. of the Nova Acta Acad. Nat. Cur. I shall trouble you with the following translations upon the subject:—"The green granules in *Vallisneria spiralis* are provided with an elliptical appendage, which is of a lighter green colour than the granules themselves, and composed of a mucoid semi-hardened matter," &c., Meyen, 1837. "It will be seen (referring to a particular diagram) that besides the green granules existing in the cells, there are distinct mucoid masses here and there enveloping the granules, and moving along with them as in company, or else keeping separate near the walls of the cells, and moving along exactly in the same manner as the green granules do. In almost all cases the green granules move first, and the mucoid mass, which is of a lighter colour, follows them. When the granule, provided with its elliptical mass of mucus, directly approaches the wall of the cell, the mucoid mass becomes drawn out or extended," &c., Meyen, 1838.

Mr. Busk refers to a *much larger transparent colourless body, varying in size, which moves with the green granules, several of them usually adhering to it*,—Meyen to a much larger body—for no less than six

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* We have directed the attention of Microscopists to this fact, in the hope that as the season advances those having the opportunity will further prosecute the inquiry into this interesting subject.—ED.

† In a letter to the Editor.

green granules, in one case, and four in another, are delineated by him as connected with the mucoid appendage; also varying in size, as is seen in the diagram of his work, and moving along with the green granules, as the present translation states. Meyen, however, calls the mucoid appendage of a lighter, clearer, or brighter (as the word may be rendered) green colour than the granules themselves; whilst Mr. Busk says it is colourless. This appears to me to be the only discrepancy between the statements, after an attentive weighing of the matter. I refer, of course, only to the *existence of a fact*, and make no comments upon the physiological *purposes* which the mucoid appendage is supposed to answer, either by Meyen or Mr. Busk. In the valuable work of this Physiologist, I have particularly referred to some pages which are devoted to the subject.

XII.—ON A WHITE INCRUSTATION ON STONES, FROM THE BED OF THE RIVER ANNAN.

By Edwin Lancaster, M.D., F.L.S.

During a short stay which the author made last summer on the banks of the Annan, in Dumfrieshire, his attention was arrested by the appearance of the stones on the banks of the river. Wherever a mass of gravel was exposed to the air, the surface of the stones appeared covered with a white incrustation, as if they had been white-washed. This appearance was more or less general on all the exposed banks, but was most evident on the stones nearest the water's edge. On examining the stones with a pocket lens, their surface appeared covered with acicular crystals, and from this it was at first concluded that the incrustation arose from the crystalization of some salt abounding in the water. On procuring, however, some stones from the water itself, they presented on their surfaces the filaments of a minute *conferva*, which appeared to be the source of the white crust; but as the existence of the conferva would not explain the crystalline appearance, it was examined under the microscope, and the appearance was found to proceed from minute acicular bodies about $\frac{1}{100}$th of an inch long, and $\frac{1}{2,000}$th of an inch broad, which were most of them arranged in a stellated form, but many were scattered in all directions. Running under the whole were the filaments of a minute conferva, on which the acicular bodies rested.

In Greville's "Scottish Cryptogamic Flora," these bodies are re-

ferred to the genus *Exilaria*, but the stellate arrangement of the aciculæ gave them a different character to *E. fasciculata*. Hooker in his continuation of Smith's "English Flora," has placed Greville's supposed plant as a synonym of *Diatoma truncatum*, from which *D. fasciculatum* is not distinct.

In Ehrenberg's great work on the *Infusoria*, these bodies are figured and described under the head of Polygastric Animalcules (p. 11. tab. xvii.) of the family *Baccillariæ*. The genus to which they belong is *Synedra*, and is distinguished by the animal being furnished "with a simple silicious prismatic carapace, when young attached by one end, when old often free, without any, or a slightly marked pedicel." The species it most closely resembles is the *Synedra Ulna*, (common eel-animalcule), which is characterized by being striated with linear corpuscules, straight, truncated at the sides, flat on the back and belly, with the apex a little dilated as they become aged. The bodies from the Annan are not striated, nor are their ends dilated, although they appear full grown. The silicious skeletons in which these little animals are invested, will account for their white appearance. Although these bodies have been often described both as plants and animals, no notice appears to have been given of producing the phenomenon here described. —*Proc. Linnæan Soc.* 1840.

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1840.]

Globules of the Blood.—Carus has observed, that as decomposition of an animal body proceeds, the globules of the blood in the capillaries first become green, and then pass into a green-coloured fluid. This he considers as a further proof of the views of Schultz, that the globules of the blood, which are of no further use, become changed into bile.

Mandl has found that the globules of the blood in *Crocodilus lucius*, possess in comparison with their breadth a greater size, longitudinally, than the blood-globules of any other animal whatever. Their breadth is $\frac{1}{100}$ to $\frac{1}{95}$ of a Millimetre, their length $\frac{1}{35}$ to $\frac{1}{80}$ Mm. Their nuclei are sometimes round— sometimes elliptical. In *Proteus Anguinas*, the breadth of the globules is $\frac{1}{30}$ Mm., their length $\frac{1}{16}$ to $\frac{1}{18}$ Mm. With the exception of the Camels and Dromedaries, the relation of the greatest breadth and length of the globules of the mammalia is, taking their diameters as = 1 : 1 ;—In the camels, the birds, reptiles, and fishes = 1 : $1\frac{1}{2}$ to 2 ; whilst in the crocodiles it is = 1 : 2 to 3.

Nasse gives the following measurements of the blood globules in man :—

	DIAMETER.		
Whole globule	0″,00027	0″,00028	0″,00030
Breadth of the ring	0″,00005	0″,000075	
Diameter of the central circle . .	0″,00015	0″,00017	
Thickness of ring	0″,000045	0″,000066	0″,000075
Apparent thickness of the centre .	0″,00002	0″,00003	

According to Gulliver, *Perameles lagotis*, *Petaurus Sciurus*, *Macropus Bennetii*, *Dasyurus ursinas*, and *D. viverrinus*, have the globules of their blood of the common form seen in the mammalia, and $\frac{1}{4800}$″ to $\frac{1}{3000}$″. In *Auchenia Vicugna*, *A. Paco*, and *A. Llama*, they are elliptical, but smaller in the first creature than in the rest.

Tragalus Javanicus has the smallest of the hitherto examined globules, being generally $\frac{1}{12000}$″, sometimes $\frac{1}{15000}$″ to $\frac{1}{9600}$″.

Nasse found that in the embryo of the adder the blood globules were smaller than those of the mother.

Schleiden has observed in the Parenchyma of the leaf of *Pellia epiphylla* a peculiar kind of *proper vessels*, which are filled with a pale yellow or purplish red fluid, but which are absent in *Aneura pinguis*.

Spongilla lacustris.—The so called Sporangia of this organised body, rightly placed by Meyen in the animal kingdom, are, according to him, essentially distinct from the Sporangia of the Algæ, and are similar to what are denominated the *winter eggs* of Polypi. They consist of a coriaceous skin, which is covered over with a thick crust, except at a small circular spot. This crust is composed of minute and delicate silicious particles of the $\frac{3}{50}$th of a millimetre in length, which particles are composed of vertically placed spicula of $\frac{1}{250}$ to $\frac{1}{200}$th of a Mm. broad, at whose extremities near the circumference, more or less toothed, little disks are found. At an after period from 4—5, or more generally 7—8 of the teeth elongate, becoming uncinate and curved rays. Between the spicula exists carbonate of lime, having a cellular structure. Within the eggs there are delicate cells filled with various granular matters. Besides the larger silicious spicula found within the substance of the sponge, there exist more delicate ones of the $\frac{1}{16}$ to $\frac{1}{10}$th of a Mm. long, having upon their surface numerous little points, which elongate as their age increases.

[*From Oken's Isis*, 1839.]

Doyere on Distoma.—Before the anterior sucking apparatus of these animalcules is placed a canal filled with fluid, containing globules of different sizes; it passes on each side of the body, forming a complete circle, and opening again into itself behind the middle of the sucking apparatus; it then pursues a single course, makes several turnings,

and expands into a kind of cloaca, which is capable of being retracted through the anus, like a glove, or like the antennæ of snails. This is the so-termed elongation of the tail, of authors. Doyere considers this canal only as a stomach with a *cul de sac*, which is elongated as far as the posterior part of the body, and the hinder portion he considers as a kind of thin intestine. In living animals, in a solution of carmine, the stomach is coloured, and frequently the upper canal. He has characterized the following species:—*D. excisum*, *D. rufo-viride*, *D. appendiculatum*, *D. cylindraceum*, *D. hepaticum*. The globules in the tissue of the *Cysticercus* of the rabbit, in which they are very plentiful, are nothing more than microscopic concretions of carbonate of lime.

Colin and *Edwards* placed stalks with leaves of *Polygonum tinctorium* in water, under a receiver, in the sun-shine, and obtained oxygen gas; in common day-light, after some days, they produced a little carbonic acid gas, but a great quantity of hydrogen gas.

Milne Edwards on the Nature and Mode of growth of the stems of Polyps.—Almost all zoologists consider the horny, as well as the calcareous corals, to be mere external inanimate crusts, simple separations of the skin, as in the serpulæ. This opinion he has discovered to be erroneous, and he considers these firm coverings to be animate, and to form as much a part of the body as the cilia or the organs of digestion, nourishing themselves like the rest of the animal, however hard they may be; they are, in fact, he states, an outer skeleton. (We believe this opinion to have been entertained for some years.) He has been induced to form this judgment in particular, from the examination of a Sertularia from the coasts of Provence. This genus consists, it is well known, of a horny tube, having internally a soft and hollow substance, which supplies the place of a stomach. The genus under observation is very thin on the younger portions, but much thicker on the older. This might be conceived to arise from a deposition of new layers on the outer surface. He has however observed, on placing a transverse section under the microscope, that the walls of the exterior tube are everywhere of equal thickness, and that it is only the inner soft substance which has become thicker; whence it follows, that the external tube must grow and nourish itself. The same process prevails with regard to the stony corals; they must receive calcareous particles, like the cartilage in its metamorphosis into bone.

C. H. Schultz has discovered, that the vesicles or globules in the blood of the elephant killed a short time since at Potsdam, differ from each other far more than those of other mammalia. This, doubtless, proceeds from the cotemporaneous presence of young, older, and very old globules. This blood, in particular, contains many newly-formed vesicles, the membranes of which are scarcely coloured; some appearing round, others flat, others folded. He also observed semilunar and elliptical globules, which he regards as instances of the transformation of the globules of chyle into blood.

[*From the Comptes Rendus*, 1841.]

Dutrochet on the circulation of Chara.—The cause of the circulation in *Chara* has hitherto escaped research; the known moving powers in no way explain it. Dutrochet was lead to investigate whether there did not exist some physical motion, of which the cause was equally unknown, and which might bear some analogy to the motion observable in *Chara*. By reasoning on the subject, he was led to consider that a similarity existed to the movements produced by small particles of camphor when placed on the surface of water, and provided they were motionless, would cause the fluid to be put in motion in their vicinity. Is it not then, says Dutrochet, reasonable to conclude that the moving power which animates as it were the pieces of camphor, is identical to that animating the fixed green globules situated on the internal walls of the central tubes of *Chara*, and from which green globules evidently emanates the motive force of the circulating fluid in contact with them, and that also of the inert corpuscles contained or carried with the fluid? The result which Dutrochet arrives at, after a lengthened and comparative series of experiments, is, that the physiological power (force) producing the circulation of *Chara*, and the physical force which produces the movement of camphor when placed on the surface of water, are identical.—[In this memoir, which is of considerable length, the Author enters into the history, and gives the results of his experiments, with a view to detail the true cause of the movement of camphor on the water; and he then takes successively the several experiments he has made on the circulation in *Chara*, and endeavours to apply them by comparison to analogous experiments made with the camphor.]

M. Ofterdinger has presented to the Academy of Sciences, at Paris, a new process for investigating the intimate structure of organs.

M. Jerichow presented at the sitting of the 1st of February, 1841, a description of an instrument he had invented, and to which he has given the name of *Thermo-Micrometer*.

M. Letellier, at the sitting of the 8th of February, 1841, addressed a note to the Academy relating to the *microscopic research of some animal fluids*.

Valenciennes on the cause of the green colour of certain Oysters.—The reasons given for the cause just cited are very various, and leave much room for investigation. Some authors attribute their green colour to their feeding on certain *Ulvæ;* others consider it to depend on the absorption of microscopical animalcules which have received the name of *Vibrio Ostrearius*. After investigating the subject experimentally, the conclusions which M. A. Valenciennes arrives at, are, that the green colour of oysters is due to animal matter, which is different from all other green organic substances hitherto noticed. As it is found in the intestinal canal, is it not reasonable to suppose that it is due to a particular state of the bile, thus furnishing a coloured substance which is fixed by assimilation on the parenchyma of the two lamellæ of the oyster,

on its branchiæ or labial palpæ, by a physiological phenomenon analogous to that which M. Flourens has observed connected with the assimilation of madder, which colours only the bones of animals, whilst the cartilages, ligaments, and tendons remain white. This green coloured substance above noticed, when submitted to microscopic examination, offers nothing remarkable, but possesses other properties given in detail in the communication.—*February* 15, 1841.

Targioni Tozzetti on the presence of Iron in Oscillatoriæ in the thermal springs of Rapolano, although no iron exists in the water.—M. Libri presented to the Academy a memoir in which the author above quoted observes the fact mentioned. He cannot therefore conceive from whence these plants obtain iron, since none is to be found in the water itself.—The iron contained in these *Oscillatoriæ* accumulates by degrees in the cavities where water is contained, as in the stony pits which are formed, and thus its presence can be sought after, and proved by chemical analysis. This remarkable observation opens much the field of inquiry of late promulgated respecting the influence possessed by exceedingly minute organized bodies accomplishing the production of certain minerals.—*February* 22, 1841.

[*From the Annales des Sciences Naturelles.*]

On the Structure of Annular Vessels in Plants.—The result of the recent researches of Hugo Mohl shows, that the development of the annular vessels agrees with the observations on proper vessels ; from the examination of these two organs it appears that the annular, spiral, and reticulated vessels, offer three different forms, intimately united, and passing frequently one into the other, but hitherto they have only been considered as degrees of temporary transformation of the same vascular utricule. It is true, that a spiral structure is the ordinary and normal state of the secondary layers of the vessels. It is not, however, the only one which may be there recognized : the annular structure exhibits a primary form, and offers, in some degree, the intermediate state between the spiral turned to the left, and that to the right. On the other hand, the reticulated structure is also met with as a primary tissue, in approaching sometimes more to the pure spiral, sometimes to the annular form. These researches in the annular vessels are directly opposed to those of Schleiden. Mohl is far from affirming that Schleiden has incorrectly observed them ; on the contrary,he is of opinion, that he is an active and practised phytotomist and manager of the microscope. Mohl considers, nevertheless, the interpretation of that which Schleiden has observed, to be incorrect, he having noticed the variation of form as being constantly accidental, and as degrees of regular, transitory, and necessary metamorphoses.—*Oct.* 1840.

On the Circulation of the Blood in Pyrosoma.—Milne Edwards observes, that the heart, which has hitherto escaped the observation of anatomists, is situated at the lower part of the body, at the side, and beneath the mass of viscera. There is a similar arrangement in *Ascidia ;*

it contracts also in a peristaltic manner, and here also the direction of the vermicular motion periodically changes, exactly in the same manner as among Ascidia ; and as in these animals the same vessels perform alternately the office of artery and vein, the abnormal mode of circulation is here verified in all the great natural divisions of the class *Tunicata* of Lamarck ; it appears, however, interesting to observe, that so remarkable a physiological phenomenon, and which has not been hitherto noticed in any other type of the animal kingdom, is not found wanting in any of the animals composing the intermediate group between the true *Mollusca* and the *Polyps.—Dec.* 1839.

On Cells of a particular structure in the Aroideæ, by Dr. Schleiden.— In the Meletemata Botanica of Schott and Endlicher, they attribute to *Monstera* Adanson, (*Dracontium pertusum*, Mill.) raphidophorous ovaries. Not being acquainted with any of the Aroideæ in which the ovaries offered a quantity of vessels of raphides, I was curious to ascertain whether the plant in question exhibited anything remarkable on this point, that might be mentioned in its generic character. On examining attentively the ovary of the plant, I found that the so-called raphides were not inorganic bodies. The carpellary leaf of the genus *Monstera* is traversed with cells of the liber of a very singular structure. These cells are in length nearly 0.1 to 0.13 Paris inches, and their thickness from 0.004 to 0.0042 Paris inches. Their sides are formed of a number of very distinct layers, perforated with pores, the orifices of which are flattened on the sides. In the interior of these cells of the liber, which are filled with a granular substance of gum, &c., are cytoblasts developed, and on these cytoblasts very thin cells are formed. These here and there break through the pores. Many of these cells have lateral branches, varying in size ; and it appears to me very probable, that these branches are formed by the walls of the cells, the cavities of which are placed in communication with that of the parent cell, in consequence of the absorption of the diaphragm. It has been, however, impossible for me to follow completely the history of their development. Similar formations are found in the bark and pith of *Rhizophora Mangle.—Wiegman. Archiv. fur Naturgesch*, 1839, 1. p. 231.

[*Revue Zoologique, Nov.* 1840.]

Duvernoy, on a species of Sponge which lodges itself in the shell of Ostrea Hippopus Lam., *by forming canals in the substance of its valves. (Read at the Academy of Sciences, Paris, 2nd Nov.* 1840.) — After having stated that several Mollusca have the singular faculty of piercing and forming a retreat in the hardest stones, and that naturalists are not as yet satisfactorily agreed on this point, M. Duvernoy states, that he observed something analogous at Dieppe, where he saw several *Patellæ* attached to rocks, and in the substance of which they had formed a pit of some millimetres in depth. The form of the pit was exactly modelled to that of the shell. He considers that the Mollusca excavate these holes by the same means as *Lithodoma, Petricola*, and *Pholades*, and that it can only

be effected by means of an acid excretion, which softens or dissolves the stone.

After these considerations, the learned professor announced, that he had found *Ostrea Hippopus*, the valves of which were perforated with holes or orifices of canals, varying in diameter from a quarter to two millimetres. He found in these canals a spongy cylindrical body, exactly filling their cavity, like a cork, and furnished with an external opercular appendage, which is distinguished from that in the interior of the canal, by its being of a deeper colour. After having given a description and good figures of this little sponge, M. Duvernoy proposed to place it in the genus *Calceponge* of M. De Blainville, and gave it the name of *Spongia terebrans*. Its characters are as follows : — " Cylindrical, branched, brown or pale yellow, externally lighter coloured in the rest of its length ; filled, or nearly so, in this first part, and more fibrous than membranous ; hollow, of the form of intestine in the rest of its extent, and more membranous than fibrous."

(Scientific Congress of Italy, held at Turin, 1840.)

[*Extracts from the Zoological Section.*]

Dr. Nardo, of Venice, read two memoirs relating to the anatomy of fish. In the first, he noticed the intimate structure of the skin, and deduced from his observations, new theories for the systematic division of this class. In the second memoir he noticed some anatomical differences presented by the cartilages of some fish, above all in Selaciens and Sturgeons.

Prof. Civinini, of the University of Pisa, communicated his discoveries relative to the jointed nature of the nerves of man and superior animals, forming, at the shoulder, (à l'epaule) a ganglion or plexus, which he discovered and first described.

Dr. Rusconi made known his anatomical process to examine the internal structure of the embryos of small animals, which it is impossible to see in the ordinary method of observing them.

M. Michelin read a treatise on some stony polyps (pierreux), forming a new genus, which he named, in honour of the President of the Zoological Section, *Caninia*.—*Dec.* 1840.

The third meeting of the Scientific Congress of Italy, will take place this year at Florence, on the 15th of September, and will last till the end of that month.

Microscopical Memoranda

M. Soleil's new Pocket Microscope.—M. Donné submitted to the notice of the Academy of Sciences at Paris, at their sitting 22nd February, 1841, a Pocket Microscope, specially destined for medical men, botanists, and travellers. This instrument, magnifying three hundred times, gives results equally satisfactory with the superior microscopes of ordinary manufacture. It may be applied to all the microscopes of Trécourt and Oberhaueser. It was made by M. Soleil, optician, and the price is only thirty-five francs. It may be made into a table microscope by means of a foot on which it can be fixed; and is so arranged that the observer can obtain the *direct* light from the sky, or from a lamp, without the necessity of a reflecting mirror.—*Comptes Rendus, 22nd February*, 1841.

Mode of viewing objects.—Much of the beauty of the objects seen depends upon the management of the light that is thrown upon or behind them; which can only be fully mastered by practice. It may be remarked, however, as a general rule, that in viewing those which are transparent the plane mirror is most suited for bright day-light, the concave for that of a lamp or candle, which should have the bull's-eye lens, when that is used, so close to it, that the rays may fall nearly parallel on the mirror: if the bull's-eye lens is not used, the illuminating body should not be more than five or six inches from the mirror. The latter is seldom required to be more than three inches from the object, the details of which are usually best shown when the rays from the mirror fall upon it before crossing; and the centre should (especially by lamp-light) be in the axis of the body of the microscope. For obscure objects seen by transmitted light, and for outline, a full central illumination is commonly best: but for seeing delicate lines, like those on the scales of insects, it should be made to fall obliquely, and in a direction at right angles to the lines to be viewed.

The diaphragm is often of great use in modifying the light, and stopping such rays as would confuse the image; but many cases occur when the effects desired are best produced by admitting the whole from the mirror.

If an achromatic condenser is employed instead of the diaphragm, its axis should correspond with that of the body; and its glasses when adjusted to their right place should show the image of the source of artificial light, or, by day, that of a cloud or window-bar in the field of the microscope, while the object to be viewed is in focus.

The most pleasing light for objects in general is that reflected from a white cloud on a sunny day; but an Argand's lamp or wax candle with the bull's-eye lens is a good substitute.

A large proportion of opaque objects are seen perfectly well (especially by day-light) with the side illuminator and the dark box as a back ground; and for showing irregularities of surface, this lateral light is sometimes the best; but the more vertical illumination of the Lieberkuhn is usually preferable, the light thrown up to it from the mirror below being, with good management, susceptible of much command and variety.—*James Smith.*

XIII.—ON CERTAIN PHENOMENA OBSERVED IN THE GENUS NITELLA, AS ILLUSTRATIVE OF THE PECULIAR STRUCTURE RECENTLY DISCOVERED BY MR. BOWERBANK IN A FOSSIL WOOD FROM THE LONDON CLAY.*

By Arthur Farre, M.B., F.R.S., &c., Secretary to the Microscopical Society of London.

The observation of a new form of vascular tissue occurring in the fossil wood from the London clay, as detailed by Mr. Bowerbank in his paper,† has induced me to offer a few remarks on an apparently analogous *recent* structure, which I several years ago observed in some specimens of *Nitella flexilis*, kept for the purpose of examining the circulation in that plant.

Before proceeding to detail the result of my own observation, I may be allowed to quote that portion of Mr. Bowerbank's paper in which this new fossil tissue is described. The author observes, that in the Herne Bay fossil "some of the vessels contain large vesicular globes, which appear to have been freely floating within their parietes; when not in contact with each other, they are perfectly globular and uncompressed. They vary very considerably in size, in some cases filling nearly the whole diameter of the vessel, while in others they do not occupy a tenth of that space. They are frequently so numerous that they fill the whole of the vessel. The structure of which these globular bodies is formed is thin and very pellucid, and no fibre or other organic structure is apparent upon its surface. There are also in some of the vessels exceedingly small vesicles, interspersed among the larger ones. A portion of these are opaque and black, but the greater number of them are transparent like the larger ones. These very minute vesicles do not exceed in size the globules of circulation in *Valisneria*, and as we find vesicles of every size, intermediate between these minute ones and the largest of the vesicles, it appears probable that the whole of them may be attributed to a more than ordinary development of globules of circulation, analogous to those observed in *Valisneria* and other plants." The author further remarks, that he has "never seen this curious form of tissue in any other wood, either recent or fossil; though he had occasionally observed very similar, large pellucid globules slowly moving in the great central cavity of the stem (of

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* Read at the Microscopical Society of London, November 25, 1840.

† An abstract of this paper will be given in a future number.

Chara), while the circulation of the smaller globules in its parietes has been proceeding with a much greater degree of rapidity."

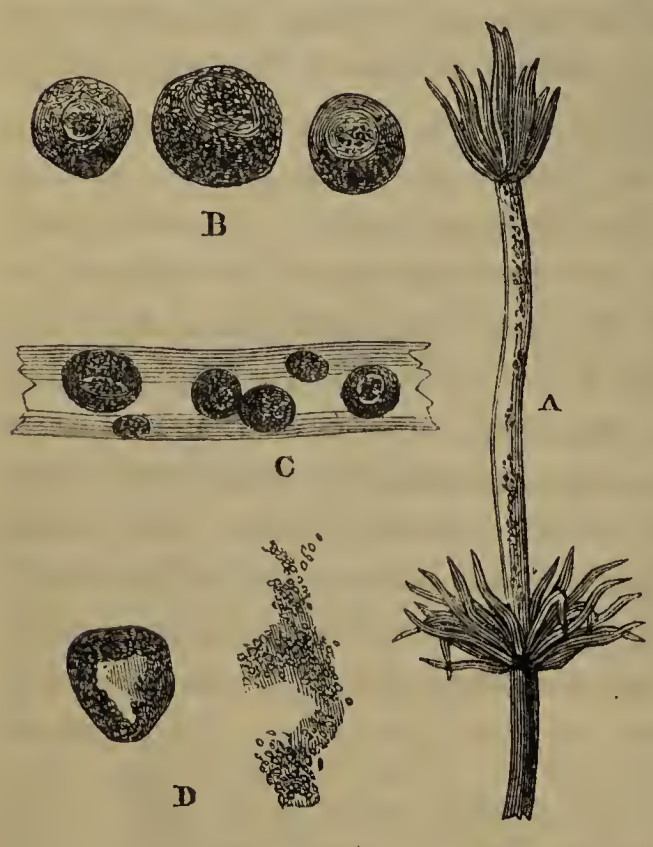
These particulars with reference to the structure of the fossil wood, and the resemblance to *Chara*, so happily conjectured, are so completely borne out by what I have observed in *Nitella*, that the description of the one might almost serve for that of the other.

In some specimens of *Nitella flexilis*, the circulation was observed to be going on vigorously up to the 4th of April, 1835. On the 6th, two days after the last observation, the circulation had entirely ceased. The green particles lining the interior of the stems and branches had shrunk from the parietes, and, together with the green circulating matter of the interior, were collected together in irregular masses within the tubes; but none of the brown bodies afterwards observed, were as yet apparent in any of the pieces.

On the 11th, five days after the preceding observation, and no intermediate one having been made, the same specimens were again examined, and were found to present characters which I had not before observed. In many of the joints, the irregular masses of green matter had resolved themselves into globular bodies of variable size, but definite form, and had changed from a green to a rich brown colour.

About half of the joints had undergone this change—the other half remaining in the green state as at the last observation; but the circulation had entirely ceased in all, and the plant was evidently dead.

In the greater number of those joints which contained the brown bodies, the green matter had entirely disappeared, leaving the tubes as transparent as glass, with the brown globules like rows of beads irregularly scattered in their interior—(fig. *a*.) These varied very considerably in number. In one long joint of the plant, about eighty of them were collected, while in one of the short branches there were only five. Some of the larger bodies were about half the diameter of thc tubes in which they were contained, while others were only one-eighth of the diameter. Those which were completely formed, had all the same character.



They consisted of tolerably regular spheres, except where their form had been slightly altered by lying in contact with each other. In almost all of them, however, and especially in the larger ones, there was a slight flattening, or a cup-like depression at one point (fig. *b*, *c*), which was generally observed to be directed towards the surface of the tube, and might have been produced by the globules coming in contact with the parietes of the tube, but was, nevertheless, retained after they were extracted from it. In the centre of this flattened portion, or cup-like depression, there was always observed to be a small collection of granules, which were of the usual size of the globules of circulation, but also of a brown colour. The brown bodies, on account of the now transparency of the containing tubes, could be examined as readily in situ as when extracted from the joints. In either case they appeared to consist of an enveloping membrane, which was probably formed by the aggregation of the green granules of the plant, assisted by the condensation of the mucous fluid of the interior; and thus forming an investing capsule, which, when torn open, was found to be filled by the *green* granules of the plant, mixed with mucous fluid—(fig. *d*). The investing capsule was very thin, and presented no other traces of structure than that which would arise from the formation of a membrane by the aggregation of granular matter.

In those joints in which the brown bodies had been formed, the green matter of the plant had in most cases entirely disappeared. In others, where they appeared to be in process of formation, they were observed to be mixed with the green matter, and in other parts again, they had not yet undergone the change from green to brown, but shewed themselves in the form of irregular masses of green matter approaching the spherical form.

It appears, then, that this remarkable change had taken place within a week after the circulation had been observed to be going on vigorously in the plant. And the nature of the change appears to be this:—The green granules which lined the internal surface of the joints when living desert the parietes, and, together with the green circulating granules of the interior, collect together in irregular masses in the centre of the tube, which then resolve themselves into irregular spheres, still retaining the granular outline, indicative of their formation by aggregation, but which they afterwards lose on assuming a more perfect spherical form, and become bounded by an investing capsule which turns of a rich brown colour, while the contained granules retain their original green.

It is difficult to imagine what purpose is intended to be answered by such a change taking place, after the circulation, and other evidences of

life in the plant have ceased. Yet, the idea of such a change being the result of a merely fortuitous arrangement of the component particles of the plant, attendant on decomposition, is negatived by the circumstance of the remarkable uniformity and symmetry of the resulting globules, which appear to possess the most definite characters, differing from each other only in size. Nor is the change by any means uniform for the whole plant; for in some parts two of the joints were observed to be in the green state, while the joint situated between them was free from green matter, and contained the brown bodies; but this might have resulted from the circulation ceasing earlier in the central joint, and, consequently, allowing more time for these changes to take place. It would appear that the enveloping of the granules by an investing membrane, was a means of preserving the organic particles in a green, and, probably, therefore, in a living state. But whether for the purpose of regeneration under a different form, (thus affording an example of equivocal generation), or whether the phenomenon was in any way connected with the reproduction of the plant, did not appear from any observation that I could make, as no further change was observed to take place in the brown bodies, beyond that which has been described, though they were kept in water for a considerable time. An appearance similar to what appears to be the first stage of this process is not unfrequently observed in living *Chara*, where a number of the green granules collect together in a mass, which either passes along with the general circulation, or remains revolving at one extremity of the tube. But I am not aware that the brown bodies now described, have been ever seen in the living plant, nor have I met with any observations which at all illustrate the point. The phenomenon, however, appears to me to bear very closely upon the remarkable form of tissue described by Mr. Bowerbank as occurring in the Herne Bay fossil, and I have therefore been induced to bring it before the Society, together with the original drawings, which were made at the time of the observation, and the preparation of those portions of the plant from which they were made, and which, though it has suffered from being kept for more than five years, during which time it has become dry, will still, I believe, afford a fair idea of the structure alluded to.

These brown globules, contained in the stems of *Nitella*, appear to differ from the globules found in the vessels of the fossil wood, chiefly in the circumstance of their being hollow spheres in the fossil, but capsules filled with green matter in the recent plant.

XIV.—On the classification of Infusoria according to their organization.*

By M. F. Dujardin.

The true Infusoria, from which it is but right to separate the *Systolida, Rotatoria, Bacillaria,* and many other microscopic beings formerly confounded with them, have an irregular form, more or less variable, and essentially *asymmetrical* (deprived of symmetry), thus bringing them near to the spherical or ovoid figure, either by their own contractility, or when vitality ceases.

They may, without ceasing to live, undergo alterations or distortions of the most varied kind, either by injury, partial decomposition, or by some change taking place in the composition of the liquid in which they exist.

Their form and appearance is variable,— sometimes being wrinkled or striated on their surface; they vary in the arrangement of the vibratory cilia, and also in a tendency to the spiral (or coil) form which characterizes exclusively this class, and distinguishes it above all from the *Radiaria.*

The *Infusoria* are produced from unknown germs, in either artificial or natural infusions; and no other mode of propagation is known, or well proved, except that of spontaneous division. The fleshy substance of their bodies is extensible and contractile, like the muscular flesh of the superior animals; but no trace of fibres can positively be observed, and the appearance exhibited is that of membrane having a diaphanous and homogeneous texture. This substance, separable only by the breaking up or death of the animal, forms in the liquid, discs or globules, which slightly refract light, and are susceptible of spontaneously uniting into spherical cavities, analagous in their aspect to the vesicles in the interior.

The vesicles generated in the interior of the Infusoria are destitute of a proper membrane, and are capable of contracting until they nearly disappear, or they settle and become fixed and aggregate. Those taken for *stomachs* are produced at the bottom of a kind of *mouth;* they enclose water filled with food, taking a certain course in the interior without preserving any connection between them or with the mouth. They at length contract and leave, in the midst of a fleshy, glutinous substance, particles not digested, or they evacuate their contents by a

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* From the Comptes Rendus, August 19, 1840.

casual opening, which has been erroneously taken for the *anus*. The other vesicles containing only water, are formed nearer to the surface, and appear to admit and expel their contents through the openings (meshes) of a loose contractile integument. They may be considered after Spallanzani, as respiratory organs.

The external organs of motion are *flagelliform filaments*, or vibratory cilia, or fleshy elongations without covering, and which appear all formed of the same living substance, possessing contractility in their whole length. None exist of a horny or epidermal nature, nor secreted by a bulb.

The eggs of Infusoria, their genital organs, their organs of sense, as well as their nerves and vessels, cannot be exactly determined, and all are induced to believe that these animals, although endowed with a degree of organization in relation to their mode of life, cannot have the same system of organs as the superior animals. The coloured spots, generally of a red hue, which are taken for their eggs, for example, cannot receive this denomination with any degree of accuracy.

If, therefore, from these data it is desired to establish a classification for the Infusoria, based on their true and only essential characters, it will at once be seen that the *form*, considered in a general point of view, is sufficient to characterize the true Infusoria as *asymmetrical animals*, separating at first some *symmetrical* and isolated types, having no relation with them; it must be observed, that the shape or figure cannot furnish generic or specific characters of an absolute kind,—the form, for example, contrary to what is observed in the other classes of the animal kind, is nearly always eminently variable. To characterize the orders, families, and genera, it is necessary to have recourse to the presence and position of certain external appendages, which have escaped the notice of ancient micrographers; afterwards completing the generic characters by the mark of some secondary character, taken from the form or some particulars which cannot be expressed with the precision which is proper to Linnæan phrases. As to species, we are compelled to employ to distinguish them, remarks as to size, colour, locality, &c., which are not, however, true *specific* characters in the sense that Linnæus and his followers attached to this word.

According to these principles, the *asymmetrical Infusoria* may be divided into *five orders*, of which the first presents *no special organ* of locomotion—the animals composing it belong exclusively to the family of Vibrionidæ; they are long, filiform, and appear to move slowly by virtue of their general contractility. A second order comprises the three families, Amibiadæ, Rhizopodidæ, and Actinophryadæ; they are

characterized by the *variable expansions* formed of the substance of the body itself, which by the aid of a proper power, elongates and extends in lobes and filaments, capable by retraction of returning more or less quickly and disappearing in the mass. The extreme slowness of their movements, characterize the latter family; the presence of a head distinguishes the RHIZOPODIDÆ from the AMIBIADÆ, which are naked. A third order takes its distinctive character from *flagelliform filaments*, or from two or more filaments of the same nature serving as organs of locomotion. This order is divided, according to the presence and nature of the tegument, into six families: the first comprises only naked animals, the MONADIADÆ; the two following comprise animals fixed by their teguments, as the VOLVOCIADÆ, agglomerated in a common mass and free; the DINOBRYADÆ agglomerated, attached by a single point on a frequently immobile branched polyp. The two other families, THECAMODIADÆ and EUGLENIADÆ, include animals provided with a tegument; but in some the tegument is contractile, and the body changes its form incessantly;—in others the tegument is not contractile, and the form is constant. The last family, PERIDINIADÆ, is distinguished by its non-contracting tegument having a furrow furnished with vibratory cilia.

A fourth order comprises the ciliated Infusoria without a contractile tegument; it is divided according to the absence or presence of a row of cilia *en ècharpe ou en moustache*, according to the presence of a mouth and appendages, or cirrhæ, in the form of *styles* or fangs—and, lastly, according to the presence, apparent or real, of a cuirass. The ENCHEYLADÆ, which are the first family of this order, have only scattered cilia and are apparently destitute of an oral opening. The TRICHODIADÆ, the second family, have an evident mouth, marked by a row of cilia. The third family, that of KERONIADÆ, is characterized by the presence of appendages or cirrhæ, in the form of *styles* or fangs. The fourth family, PLOESCONIADÆ, exhibits the appearance of a helmet, which disappears and decomposes, analagous to the living animal. The fifth, on the contrary, ERVILIENIDÆ, is distinguished by a real and permanent helmet.

The fifth and last order, is composed of all the Infusoria higher in their organization, which possess a loose, contractile tegument, marked by regular folds or striæ, or granulations, on its surface, or simply by a regular arrangement and series of vibratory cilia, which, in this case, covers their bodies. The absence of a mouth distinguishes the first family, that of LEUCOPHRYADÆ. Two other families, PARAMECIADÆ and BURSARIADÆ, have, on the contrary, a very evident mouth; but in the latter alone, the mouth is provided with a strong row of cilia in *écharpe* or

spiral. The Infusoria of the last two families are distinguished from the preceding by the circumstance, that instead of swimming freely in the liquid, they are at least temporarily fixed,—such are the Urceolariadæ, which fix themselves voluntarily; the Vorticelliadæ swim, attached by their pedicels, and become free only at a certain period, or are always attached.

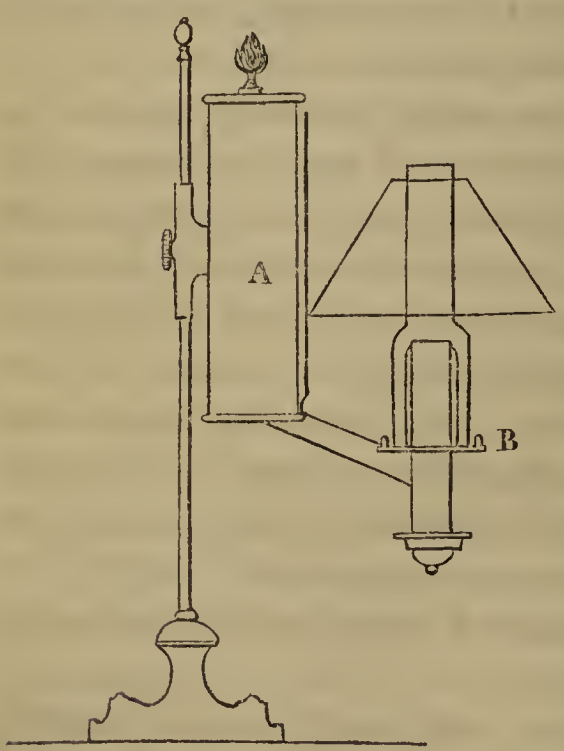
Such are the twenty families, which, apart from the Vibrionidæ, very imperfectly understood, appear to me to rank thus in a manner more natural, and more in conformity with their mutual affinities. They are divided, according to their secondary characters, into about ninety-five genera, as given in a Table which will be inserted in a future number.

Hints to Microscopists.*

I.—On a contrivance for effectually burning common oil in an Argand lamp, etc.

By George Gwilt, Esq., F.S.A. &c., &c.

The great advance in the price of the best spermaceti oil within the last two or three years, has brought forward a number of expedients in the construction of lamps on the one hand, and on the other, in the substitution of oils of lower price; all, however, "*allowed* to be equal to the best sperm oil," i. e. by the vendors. Few, if any of these, seem to be altogether satisfactory; and after some thirty or forty years' experience, I still make use of the fountain lamp (fig. A) with which I began, and which if not remarkably ornamental to look upon, is, perhaps, the most useful of any in its application; of course, forms of more elegance may be obtained, to suit the taste of more fastidious purchasers, regardless of expense.



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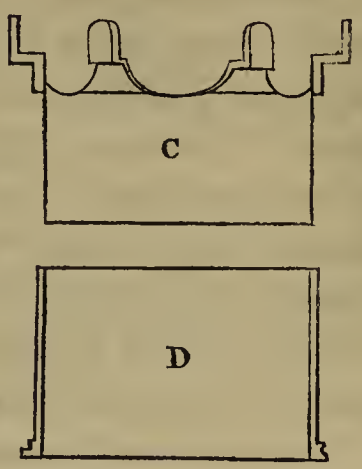
* Under this head we propose to give, from time to time, details of important facts to the microscopic observer, such, at least, as may interest him as connected with the use of his instrument, or the mode of preparing and mounting objects. This paper of Mr. Gwilt's we consider of great importance, as it at once places in the

When the lamp has been properly trimmed and lighted, it must have been observed that in passing the glass chimney over the burner, a maximum of light is obtained by the rapid influx of atmospheric air at a certain elevation of the glass, which subsides as it is lowered down to the rim B, whereon it is usually supported. To adjust and support the glass at that precise degree of elevation which the variable sizes of different glasses may require (thereby producing a very different effect from the usual method, both in the quantity and quality of the light), the simple contrivance, C and D, has been tried, and found to answer the purpose very effectually.



The diagrams C and D, are, perhaps, sufficiently explanatory to shew their construction, as well as their application; but to be a little more explicit, D is the lower portion of a thin brass tube, made to fit in between the bent wires of the burner and the brass rim B, or, in other words, to take the place and position of the chimney glass. C is the upper half of the sliding tube, and should be made with sufficient accuracy to slide or turn round easily in D, at the same time that it fits closely and firmly; this upper part is provided with six projecting arms, to receive and support the chimney glass. Four of these arms are shewn in the diagram, viz., two in section, and two in elevation; a segmental opening is cut from one arm to the other all round, as well for the free admission of air as to remove all obstruction to the light, which would otherwise take effect. The two tubes being now put together as one tube, and placed in the rim which the glass occupied, and the glass also in its new position, the upper half is raised or lowered to the required height for a maximum of light, and more perfect combustion of the oil.

The diameter of the lower tube is one inch seven-eights, the diagram being drawn to one half the linear dimension: this size may vary a trifle in different lamps. The difference in the height and diameter of glass chimnies is however much more variable, as was before alluded to, requiring a different adjustment in the different cases respectively;

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hands of the microscopist a ready and certain mode of obtaining a good light, at a moderate expense, and renders both the quantity and quality more at control than any means hitherto adopted. We have witnessed the effects produced, and can safely answer for its efficiency —Ed.

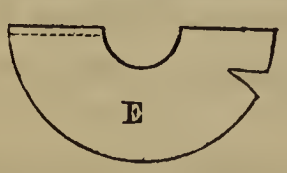
it will be readily perceived how the requisite arrangement is provided for.

To impede the light as little as may be, as well as to improve the general appearance, all the projecting angles of the arms and segments should be champhered away *from* the light, and all the brass-work of the upper half tube should be bronze colour, as the reflection of the light upon it is so vivid as to produce an unpleasant effect upon the eye. With these precautions, the appearance is rather ornamental than otherwise; in point of economy, a less expensive addition can scarcely be devised.

I trust it will not be out of place to add a word or two respecting the oil. After many trials, I find none burn better or brighter, with less charring of the wick, than the patent cocoa nut oil,* at 4s. 6d. per gallon. It is true, that two objections are generally made to it,—1st, The concrete form it assumes in cold weather; and, 2nd, A rather unpleasant smell emitted when in use. Proximity to the kitchen fire is obviously the remedy for the first of these; and the more perfect combustion produced by using the sliding tubes, very nearly, if not entirely, does away with the latter.

The inner barrel or reservoir of the lamp, A, is seven inches in length, and two inches one-third in diameter, and contains three quarters of a pint of oil. This will burn a little longer than ten hours, and is a sufficient supply, without replenishing, for a very long winter's night; consequently, the cost is but a little more than one halfpenny per hour. I believe the best sperm oil lasted about the same time.

The shade, also, is a very important adjunct. In my opinion, those made of half a sheet of good foolscap paper are unquestionably the best, by striking thereon two semicircles, as in diagram E, the longest diameter being thirteen inches, and the shorter one four inches, fitting and adapting it to the skeleton-sliding frame as the case may require, and then glueing or pasting the superfluous edges together. When once properly fitted, another pattern may (previously to the glueing of the edges) be traced out and kept at hand, from which any number may at any time be drawn, and a new shade made when wanted, in less than ten minutes. When it is lowered down a little more than shown in the diagram, the penumbral shadow below is almost wholly dissipated. These shades are much less fatiguing to the eye than the contrast occasioned by an opaque body in juxtaposition with a bright



* Price and Co. of Belmont Place, Vauxhall.

light, also diffusing a more subdued but useful light around the apartment.

I fear I have carried out these observations to a most inordinate extent but a good light is almost as essential as a good microscope; and as its use and value is not confined to the microscope alone, I trust your indulgence will extend to the time and space I have occupied on the subject, in the hope and expectation that it may be useful to the readers of a journal so likely to promote the advancement of scientific investigation, by such aid and means as that valuable instrument, the microscope, so abundantly affords.

Extracts and Abstracts from Foreign Journals.

[*From the Comptes Rendus*, 1840.]

*On the origin and mode of development of Spermatic Animalculæ.** *By M. Lallemand.*—M. Lallemand has arrived at some very curious results in consequence of his microscopical researches on the seminal fluid of man, both in a state of health and disease, and on that of mammalia, birds, reptiles, crustacea, and mollusca. These experiments at first sight leading to very different results, so illustrate each other, that M. L. has been able to point out that the different pathological conditions of this fluid in man are observed in all these animals. The following are the most curious of the results at which he has arrived:—

The spermatic animalculæ are the result of secretion, and, like other secreted matters, are susceptible of numerous modifications, and are under the influence of all disturbing causes. Thus they diminish in number, in volume, in density, and in form, during disease; and their modifications, in this respect, are greater, and their resistance of decomposition less, the more serious the nature of the disease. Sometimes they become very scarce, or are even altogether replaced by pyriform, ovoid, or spherical bodies. These bodies appear to be endowed with life, for they move about with great ease, and after death assume a brilliant lustre. Their form is in general very regular. At the period of puberty these globules precede the appearance of the spermatic animalculæ, and again replace them in old age, and during many diseases. They are, in fact, the results of an incomplete or imperfect secretion.

These alterations in form, size, &c., were also observed to take place in animals at their breeding or rutting seasons, and were especially remarked in birds. In them, the testicles, which are pale, soft, and flabby, during the period of repose, become injected, hardened, and reddened, during the breeding season. They at first contain only a homogeneous and transparent fluid, but which soon becomes filled with granular and then globular bodies. The spermatic animalculæ soon

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* From the Edinb. Med. and Surgical Journ. April, 1841.

after make their appearance, at first exhibiting but little motion; but afterwards all those signs of life usually observed when fully developed appear. The testicle is then four or five times more voluminous than it was before the sexual period arrived; and the very same phenomena are observed at each sexual period.

In man it is only at the period of puberty that these phenomena are observed, excepting always when they result from the effects of disease.

In the seminal canals the spermatic animalculæ are very numerous, and clustered together in groups, and are not generally quite dry. In all these groups the heads of the animalculæ are directed towards the epidydimis, whilst their tails point to the surface of the testicle. When they arrive at the *vas deferens*, they separate and become more mobile. The fluid of the *vesiculæ seminales*, of the glands of Cowper, and the prostrate, appear to have no other use than to allow of their moving more easily. In the mollusca the spermatic animalculæ die before the individual. This was especially remarked to occur in the bivalves, which can live for some time out of the water, by keeping their valves closed. This fact is easily ascertained by examining the spermatic fluid immediately after these animals are first taken out of the water, and again before the death of the animal.

These facts appear to authorize the conclusion that spermatic animalculæ are true secretions.

Physiologists show much unwillingness to admit that glands can secrete living bodies, and that, if it were so, the testicle would be the only example. But the ovaries secrete the ovules, which, even before impregnation, are living bodies, which become more perfect in the oviducts after their separation from the ovary, in the same way as the spermatic animalculæ do after their secretion. The ovaries are precisely analogous to the testicle; so much so, indeed, that in the inferior classes of animals it is very difficult to distinguish them from each other. Their position, their colour, the disposition of the oviducts, and of the *vasa deferentia*, are quite similar. This similarity has caused many errors of classification, into which even distinguished naturalists have fallen. But the microscope, by detecting a spermatic animalcule in a body which was generally considered to be an ovary, has corrected many of these errors. Thus Provost discovered that muscles are not hermaphrodite; and Milne Edwards and Lallemand have ascertained the same with regard to the genera Cypris and Patella. In the Medusæ, the similarity between the spermatic animalcules and the ovules is very striking, seeing that the animalculæ are enveloped in true capsules, which may be drawn out from the testicle. In some of the aggregated polypi, the resemblance is very great between the male and female organs. In them the spermatic animalculæ are found between the digestive canal and the walls of the body, having no special organ of secretion, and the ovules are formed in the same situation, there being in them no ovary.

In birds, each group of spermatic animalculæ is half enveloped in a hollow, very thin, and transparent sac, which receives all the heads of that group.

In the crab, the straight canals which represent the testicles contain free spermatic animalculæ; but in the dilated portions of these canals they are found enclosed in capsules with thin walls. The testicles of the Cephalopoda are of a very remarkable construction: there exists in their interior a membrane which is spiral in Sepia Octopus, but divided into four distinct compartments in Sepia officinalis. The *vas deferens* is besides very long, and spirally twisted; the glans is complex and fleshy. These organs are filled with a great quantity of a viscid fluid. Within the testicles spermatic animaculæ are found exactly similar to the ova—a circumstance which proves that these animalculæ do not come from the capsules. The formation of the spermatophora appears to be easily explicable:—when the spermatic animalculæ arrive at the *vas deferens,* they come in contact with the surrounding viscous fluid, which forms a capsule or envelope over them, simple when the organs are simple, and double when they are double. When the liquid found in these canals is aqueous, the animalculæ move about with freedom.

The capsules have a great affinity for water, which penetrates them by endosmose, and bursts them when they are simple. When there are two membranes, the outer one cracks, and allows a long prolongation from the internal membrane to project through it. The movements of the ova of the Cephalopoda are not produced by muscular action, but in consequence of this endosmose.

The compound ova of many of the leeches, planariæ, and Cephalopoda, are formed in the same manner, and exhibit still further the close resemblance between the ovule and the spermatic animalculæ.

In the testicles of the snake small brilliant bodies are met with, which become elongated in form when they reach the epidydimis, and in the *vas deferens* acquire a tail. Thus it appears that in these animals it is easy to trace the development of the spermatic animalculæ at its different periods of growth. These brilliant bodies are thus proved to be but the rudiments of the spermatic animalculæ, around which, first a head, and then a tail appear. They are to the spermatic animalculæ what the vesicle of Purkinje is to the ovule.

M. de Lignerolles announced to the Academy of Sciences, Paris, that he had discovered a new process for injecting the *tubuli seminiferi,* and requested that a committee be appointed to report on the results obtained by this new means.—*8th March,* 1841.

M. Ch. Chevalier, on the occasion of a communication recently made to the Academy, on a microscope of small dimensions, stated, that in his *Manuel de Micrographie,* 1839, he has given a description of an instrument, measuring four centimetres in length, possessing a magnifying power of 500 times.—*8th March,* 1841.

M. Ch. Chevalier made some remarks also on the Stanhope lens, and detailed the following as some of its inconveniences:—

1. The focus not being capable of adjustment, two individuals of different sight cannot make use of the same instrument:

2. As the object to be examined is fixed to the lens, it is requisite, on its removal, to rub the lens, in order to remove any adherent matter, and which, on account of the repeated friction, will soon be found scratched and unfit for use :
3. The magnifying power of this lens is too small to allow of its employment in a great number of instances, in which it would be exceedingly useful, on account of its great portability.

These disadvantages M. Chevalier has remedied, by employing a doublet, furnished with a very thin piece of glass, which is fixed in front of the lenses, in a ring (barillet), and put in motion by a very simple piece of mechanism. The instrument, supplied with this arrangement, may be adjusted to the focus of the operators, and is not so likely to be affected by the causes above mentioned.

M. Lerebours, at the sitting of the 29th March, 1841, made some remarks on M. Chevalier's objections to the use of the Stanhope lens, as above quoted. The *first* inconvenience exists, as M. L. asserts, in theory, *but only in the most near-sighted individuals;* and in support of this opinion he states, that he has never met with a person who saw indistinctly with Stanhope lenses. To the *second* objection M. L. cannot see how the surface of the Stanhope lens becomes more scratched than the lamina of very thin glass used by M. Chevalier. *Thirdly*, The Stanhope lenses usually magnify 40 times ; he has however made them with a magnifying power of 80 diameters. According to the experience of micrographers, excessive enlargement is rather an inconvenience than an advantage, above all, in instruments intended for excursions. He further adds, that M. Chevalier, in detailing what appear to him as imperfections in the Stanhope lens, has omitted to speak of its advantages. Thus, he says nothing as regards the extent of field afforded by this lens, which amounts to 35 degrees, while Wollaston's Doublet, which he uses, scarcely has a field of 15 degrees, and cost four times the money.

[*Revue Zoologique, Nov.* 1840.]

Observations on the mode of formation and development of Zoosperms in the Batrachians.—In the interesting memoir of *M. Lallemand*, read to the Academy of Sciences in November 1840, on the question of the production and alterations that zoosperms undergo under certain circumstances, M. Pelletier states, that in 1834, at the Society of Natural Sciences, and on the 31st March 1838, at the Philomatic Society, he communicated the results of his labours and observations on the zoosperms of the frog, an abstract of which was printed in the April number (1838) of the Journal of the Institute, p. 132. He describes in this note a kind of globule, differing from that of the blood, in the testicles of young frogs. These globules are spherical, and undergo particular changes. According as the young frogs approach the adult state, and the period of copulation, these round globules may be seen

to become pointed, and subsequently more deeply indented. The extremities assume an elongated character, and adhere to each other; they form a striated cone, which increases much in size at the period of copulation. These striæ soon separate, and present the globule surmounted by a vessel with oscillating filaments, which is in fact a mass of zoosperms still attached by their heads, their extremities only being free. In a short time they may be seen to detach themselves, one after the other, and to abandon the punctuated globule. He has in addition shown the formations of the animalcules, which passing, by intermediate degrees, at length assume the form of a ciliated *cupel** before death stops their progress. These transformations become more rare as we ascend the scale of the animal creation.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

April 28th, 1841.—*Richard Owen, Esq., F.R.S., President, in the Chair.*

Dr. J. Lee, and Messrs. T. L. Wheeler, and H. H. White, were elected members.

A paper was then read by Dr. Arthur Farre, entitled "On the minute Anatomy of the Larva of *Anthomyia caniculata* of Meyen," (an abstract of which will appear in the next number.) An animated discussion followed the reading of this paper, in which Messrs. Owen, Bowerbank, Varley, Sir Oswald Mosely, and others, took part; and during which various opinions were elicited as to the modes by which this parasite might have obtained entrance into the human body.

Mr. Bowerbank made some verbal observations "On the Generation of Sponges," detailing some new facts he had recently discovered when examining the structure of Agates.

Mr. Jackson exhibited to the meeting a Portable Candle Lamp for Microscopists, which burns the candle without wicks, as manufactured by Molyneux. The Society then resolved into the conversazione and examination of objects.

Microscopical Memoranda.

On a method of Illuminating Microscopic Objects.—Considering a perfect microscope as consisting of two parts, viz., an illuminating apparatus, and a magnifying apparatus, Sir D. Brewster states, that it is of more consequence that the illuminating apparatus should be perfect, than that the magnifying one should be so; and that the essential part of his method consists in this:—that the rays which form the illuminating image or disc shall have their foci exactly on the part of the microscopic object to be observed, so that the illuminating rays may radiate as it were from the object, as if it were luminous. Now this can only be well attained by illuminating with a single lens, or a system of lenses, without spherical or chromatic aberration, whose focal length,

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* Cupel, a vessel used for assaying.

either real or equivalent, is less than the focal length of the object-glass of the microscope. The smaller the focal length of the illuminating lens, or system of lenses, the more completely do we secure the condition that the illuminating rays shall not come to a focus. either before they reached the object, or after they have passed it. When Dr. Woollaston recommended for an illuminating lens, one of three-fourths of an inch in focal length, in which the microscopic object was placed in a vortex of foci, where the rays crossed in a thousand points, both before and after they fell upon the object, he could have had no idea of the new method of illumination. In the construction of a perfect microscope, Sir D. Brewster recommends that the illuminating and magnifying apparatus should have separate and similar movements along the same rod or bar, and that the stage for the objects should be unconnected with either, and should have also a motion independent of both. —*Rep. Brit. Assoc.* 1840.

On the Berg-Meal from Swedish Lapland.—Dr. Trail gave an account, at the Roy. Soc. Edin., of the composition of a substance brought, under the name of *Berg-Meal*, from Swedish Lapland, by Mr. Laing, in 1838. It was found under a bed of decayed mosses, forty miles above Degersfors, in Umea Lapmark. When examined by the microscope, it was found to consist of several species of minute organic remains, which Ehrenberg has considered as the silicious skeletons of infusoria. The largest measured from 0.006 to 0.0005 of an inch. On analysis, Dr. T. obtained 22 per cent. of organic matter, entirely destructible by a red heat; and he found the snow-white residue, which still retained the microscopic forms to consist of 71.13 of silica, 5.31 alumina, and 0.15 oxide of iron. He considers the organic matter and the silica as the essential ingredients, and the others probably as accidental. As a mixture with food, the quantity of organic matter in the Berg-Meal gives it a preference over the steatites and clays used for a similar purpose by some rude tribes.—*Proc. Roy. Soc. Edin.*, 18*th Jan.* 1841.

The Electrical Organs of the Torpedo.—A paper, entitled, "Miscellaneous Observations on the Torpedo," by John Davy, M. D., was read at a meeting of the Royal Society, on 4th March, 1841. The experiments described in this paper were made on a single fish, of middle size, recently taken out of the water. Portions of the electrical organs, cut transversely in thin slices, exhibited, under the microscope, many elliptical particles, apparently blood corpuscles, the long diameter of which was about 1-800th, and the short about 1-1000th part of an inch, and a few filaments, apparently nervous, irregularly scattered—some of them tortuous, and all of them about the 2000th of an inch in diameter. The latter bore no resemblance to muscular fibres. The blood contained some globular particles, having the diameter of the 4000th of an inch, mixed with the elliptical. The mucus for lubricating the surface, was found to contain globules apparently homogeneous in substance, but of irregular outline, and in size varying from the 2000th to the 270th of an inch.—*Athenæum.*

XV.—OBSERVATIONS ON THE BLOOD DISCS AND THEIR CONTENTS.*

By John Quekett, Esq., M.R.C.S., &c.

THE author, after briefly alluding to the great importance of the blood in the animal economy, and to the erroneous opinions which had been entertained respecting its globules or discs, then proceeded to state, that in his frequent examinations of the blood of the human subject, he has often been attracted by the curiously corrugated or mulberry-like appearance which many of the discs presented, and at first he attributed this change in form to the salt and water which had been used to dilute them with, previous to examination. The fluid consisted of five grains of salt to an ounce of water; whenever this was added to recent blood, the discs very soon assumed this mulberry-like character. The first effect produced on the addition of the saline solution was that of the discs becoming stellate; little points appeared first on their edges, and subsequently on their flattened surfaces as well, and after a time these points become rounded, and eventually each disc assumed a mulberry-like appearance, which gave him the idea of their containing small globules or granules in their interior, as ultimately proved to be the case. On one occasion, whilst examining some blood which had been diluted with salt and water, and having been prevented from watching it for a few minutes, he was surprised at the great number of small granules which had made their appearance during this interval, which led him to suppose, that these granules might have escaped from some of the red discs, and therefore watched to ascertain whether such was the case. After viewing them for some minutes, he distinctly saw for the first time, one or two of these little bodies escape suddenly from the interior of one of the discs, and this soon after was followed by a second, then a third, and so on, until six or seven had escaped. Numerous opportunities having since offered of verifying these observations, it has been found that from most of the discs six or seven of these little granules escape, some being emitted suddenly from the parent disc, whilst others merely make their escape at the edge, and there remain, giving the disc a beaded margin, whilst those, on the contrary, which were projected to some little distance from the parent, moved about the field

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* Read before the Medico-Chirurgical Society of London, March 23rd, 1841, and abstracted by the author.

of view as if they were animated, which fact will be again alluded to. It was subsequently found, that those discs which had given off these little granules from their interior, disappeared from the field of view, not suddenly bursting, but gradually getting more and more transparent, till no trace whatever of them was to be seen which was attributed to the solvent power of the salt and water.

Having proceeded thus far in his observations on the blood diluted with salt and water, his next endeavour was to prove whether these changes in any way depended upon the saline solution, and whether the same phenomena would occur in blood fresh drawn from the body, having no other fluid for the red discs to float in than its own *liquor sanguinis:* accordingly, some blood was taken from a small incision in his arm, and placed on a glass, and covered lightly with a thin piece of mica. At first no trace of spinous discs was to be observed; but after a few minutes they sprang up in all parts of the field of view, but their surfaces were not so much corrugated as when the saline solution was used, neither did the change from the ordinary disc to the spinous one go on so rapidly; but all the other phenomena were precisely similar to those which took place in the blood treated with salt and water.

By access to the splendid library of the Royal College of Surgeons, he has been enabled to ascertain what had been done by others; and it is curious to remark, how beautifully some of the observations of the oldest examiners of the blood can be confirmed and explained by what he has himself witnessed; and he likewise has found, that many things known and described by them, have been entirely overlooked by writers of modern date. Leuwenhoeck states, that each disc was composed of six smaller ones. Hewson knew that the discs sometimes assumed a mulberry character, and that the discs of the blood of the eel would sometimes split and allow the nucleus to escape; but he attributed these changes to putrefaction, and states, that human blood discs will become corrugated, and appear like mulberries when putrid serum is added to them. From this time down to within the last two or three years, these appearances have been nearly overlooked. Professor Schultz must have witnessed the escape of the granules from the red discs, but calls them air bubbles; he states, that the powerful contraction of the vesicular membrane, excited by the salt and water, caused the elastic fluid contained in the vesicles to be pressed out, and to escape in the form of air-bubbles,—his idea being, that a gas was contained in the interior of the vesicle around the nucleus. It has been stated in the preceding part of this paper, that some of the little granules, after their escape from the parent,

would take on a molecular movement. This fact must also have been noticed by Majendie, for in his Lectures on the Blood, published in the Lancet for 1838-39, he states, "that when blood was kept for 24 or 36 hours, the discs became puckered up, and besides this, a number of Vibriones or Monades appeared at the same time in the serum, which devour the red globules." Others have made mention of the corrugated discs, and of the little granules; but all have singularly failed in ascertaining their nature or their source; they have been described by authors under the names of lymph, chyle, and fibrin globules. Besides these and the red discs, other bodies are seen in the blood, which are much larger than the ordinary discs, and have been described by some observers as pus globules; whether so or not, they give off granules from their interior, but without becoming first spinous, like the red discs. The changes described have been found to take place more rapidly in the blood of some individuals than in that of others, and in the same individual at different times, the best subjects being those of an inflammatory habit of body. There is one essential thing to be borne in mind, which is, that the blood must not have been suffered to coagulate before examination; when this has commenced, and the discs have become aggregated together like piles of money, the changes before described will not take place. From the repeated observations of the author he arrives at the following conclusions: — That each red particle of human blood is a flattened circular disc, consisting of an outer membrane or envelope, with a thick gelatiniform fluid in its interior, which, under certain circumstances hereafter to be noticed, is capable of becoming granular, and of escaping from the envelope in the form of small globules, the general number being about six or seven for each disc: also, that the discs may present either a bi-convex or bi-concave figure, of which the latter form is by far the most numerous, which is in a great measure dependant upon the quantity of the gelatiniform fluid which they contain in their interior. The existence of a nucleus, as described by Hewson, Müller, and other observers, he has entirely failed in making out. At present he declines stating what he has ascertained these little granules (so often spoken of) to be; these, together with the important part they play in some of the effects of inflammation, as well as some other properties of the blood, will form the subject of another paper, which he hopes shortly to lay before the Society.

NOTICE OF THE RESULT OF AN EXPERIMENTAL OBSERVATION MADE REGARDING EQUIVOCAL GENERATION. *

By F. Schulze of Berlin.

Since the question respecting *generatio æquivoca* has attracted the attention of naturalists, the developement of living organisms has never been observed in vessels from which all air had been expelled by boiling, and which had been hermetically sealed. The access of air has been regarded as a necessary condition for the primary formation of Infusoria from decomposing organic matter, so that the mere circumstance of covering an infusion with a stratum of oil, removed that condition. But the question still remained undecided,—If the access of atmospheric air, light, and heat to *infundirten* substances included of itself all the conditions for the primary formation of animal or of vegetable organisms? And, in this point of view new direct experiments were considered to be very desirable. The difficulty to be overcome, consisted in the necessity of being assured, first, that at the beginning of the experiments there was no animal germ capable of developement in the infusion; and secondly, that the air admitted contained nothing of the kind.

I filled a glass flask half full of distilled water, in which I mixed various animal and vegetable substances; I then closed it with a good cork, through which I passed two glass tubes bent at right angles, the whole being air-tight. It was next placed in a sand-bath, and heated until the water boiled violently, and thus all parts had reached a temperature of 212 F. While the watery vapour was escaping by the glass tubes, I fastened at each end an apparatus which chemists employ for collecting carbonic acid; that to the left was filled with concentrated sulphuric acid, and the other with a solution of potash. By means of the boiling heat everything living, and all germs in the flask or in the tubes, were destroyed, and all access was cut off by the sulphuric acid on the one side, and by the potash on the other. I placed this easily-moved apparatus before my window, were it was exposed to the action of light, and also, as I performed my experiments during the summer, to that of heat. At the same time I placed near it an open vessel with the same substances that had been introduced into the flask, and also after having subjected them to a boiling temperature. In order now to renew constantly the air within the flask, I sucked with my mouth, several times a day, the open end of the apparatus filled with

* From Jameson's Journal, Vol. 23.

solution of potash; by which process the air entered my mouth from the flask through the caustic liquid, and the atmospheric air from without entered the flask through the sulphuric acid. The air was of course not at all altered in its composition by passing through the sulphuric acid in the flask, but if sufficient time was allowed for the passage, all the portions of living matter, or of matter capable of becoming animated, were taken up by the sulphuric acid and destroyed. From the 28th of May till the beginning of August, I continued uninterruptedly the renewal of the air in the flask, without being able, by the aid of the microscope, to perceive any living animal or vegetable substance, although during the whole of the time I made my observations almost daily on the edge of the liquid; and when at last I separated the different parts of the apparatus, I could not find in the whole liquid the slightest trace of infusoria, of confervæ, or of mould. But all the three presented themselves in great abundance a few days after I had left the flask standing open. The vessel which I placed near the apparatus contained on the following day *Vibriones* and *Monades*, to which were soon added larger Polygastric Infusoria, and afterwards *Rotatoria*.

XVII.—ON THE DEVELOPMENT OF THE VASCULAR TISSUE OF PLANTS.*

By E. J. Quekett, Esq. F.L.S., &c.

In these observations it was shown that the membranous tube which forms the parietes of vessels, originates from a cytoblast or nucleus, in a manner similar to that described by Schleiden, in the formation of ordinary cells of a plant, from which, at first, it is difficult to recognise them; but in a short period they assume the usual elongated cylindrical form, and the cytoblast becomes absorbed.

Immediately after this state, and before the fibre becomes deposited, the contents of the young vessel, which appear to be gelatinous, become charged with innumerable granules, so small as not to allow light to be transmitted through them—looking as blackish dots, and just visible under very high magnifying powers. These granules possess the motion known as "active molecules," and after a short time, when they have become a little enlarged, they begin to adhere to the

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* Abstract of a paper read before the Microscopical Society of London, February 19th, 1840.

inner surface of the cylindrical cell containing them; and it appears that this direction can be in most instances resolved into the spiral form, even in those vessels in which when the fibre is perfect that form is lost from changes that have occurred since the primary deposit of the granules.*

The singular law of the spiral arrangement of the granules was mentioned as deserving some attention, being sometimes arranged in the direction of a right-handed screw—in other cases in the opposite manner; sometimes in a single screw—in others as a compound one; many fibres running to constitute the helix. It was considered not improbable that these granules possessed certain polarities, and that also the usual continued passage of electrical currents through the axis and branches of a plant may possess the power of determining the linear and spiral order of floating granules, somewhat as the electrifying of the particles of gold-leaf mixed with water causes them to assume a linear condition; but there can be no doubt that much in this matter is effected by the agency of the vital powers of the cell itself, controlled by the influence of the plant.

It had been conjectured by Schleiden (whose observations the paper was intended in a great measure to confirm) that a current existed between the gelatinous contents of the vessel and its wall, which preceded the formation of the fibre within, and gave to it the direction it afterwards took. This opinion was shewn to be not altogether correct, by the fact that the granules become separately attached to the inside of the vessel without any discernible distance from each other, beginning first at one end and proceeding gradually to the other; occasionally a vessel being found, in which part had the granules laid down in the spiral direction, and the other as yet without any adhering to the membrane,—the fibre elongating like a root by the materials for its increase being added always to the growing point.

The granules so attached, becoming nourished by the contents of the vessel, have the moniliform appearance they first present in a short

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* The author, at the period of reading this paper, had examined several specimens of plants in which it appeared that the spiral form was not peculiar to all, and that the granules were sometimes deposited at the commencement in the manner in which the fibre was found ultimately to obtain. This induced him to mention in the original paper, that each vessel had a peculiar arrangement of the granules for itself; but subsequent observations have led him to believe, that the spiral form more or less perfect is the type of all, which opinion is entertained by other vegetable anatomists.

period obliterated, and the fibre thereby obtaining a clear border which completes its development.

This act is one which is believed to be met with in all vessels at their origin, but is frequently modified in certain vessels afterwards—viz., in the *annular vessel*, according to Mohl, the rings of fibre in this vessel are formed by the union of one coil or coils of the fibre, in its early condition, and afterwards separating from the others, or adhering and becoming perfect rings in the interior of the vessel. In the *reticulated*, on various portions of the original spiral fibre, a granule becomes enlarged in the line, and forms the starting point for a branch of fibre, which connects the turns of the spiral together, in various portions, and in various directions. In the *dotted* and *scalariform* vessels, the fibres become so connected as to leave meshes or portions of the membranous wall of the vessel without any deposit within—and this spot so left, constitutes the *dot* in the former, and the *linear marking* seen on the walls of the latter. This dot is plain in all such kind of vessels, excepting those found in woody Exogens, where it possesses (from some slight difference of structure) a central mark, making it analogous to that on the woody tissue of coniferous plants, with which the author thought it identical in structure, and probably in function, but only of a smaller size.

The paper was illustrated with numerous diagrams representing the successive stages of the minute process described.

XVIII.—ON THE STRUCTURE OF THE MACULA LUTEA OF THE HUMAN EYE.*

By Dr. Grube of Königsberg.

THE yellow spot in the human eye is situated on that precise point of the retina which answers to the posterior point of the axis of the eye, and is, therefore, the only part of the retina in which the eye perceives with perfect distinctness (in *direct* vision) the figures represented on it; since the remaining surface serves, as is well known, only for very imperfect (*indirect*) vision. Of the structure of this yellow portion, which is so much more delicate than the rest of the retina, that, from its susceptibility of injury, it was for a long time conceived to be perforated, I have no precise knowledge. I have often examined it in the

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* From Müller's Archiv. fur Anatomie und Physiologie, Heft 1, p. 38, 1840. Translated by Mr. G. F. Richardson

most fresh state I could select, with a power of three hundred linear, but could never arrive at a satisfactory result; and, indeed, I usually found the structure of the retina in the human eye, to be far less distinctly recognizable than in the eyes of animals recently killed. This indistinctness of the objects I conceived to be attributable to the decomposition which so speedily attacks the eye, since, in animals also which have been two days dead, the structure of the retina is no longer distinctly to be seen. The eye is decidedly that part of the body in which traces of incipient decomposition first display themselves; the cornea in a few hours after death acquires a folded aspect, and the eye appears as if it had lost a great part of its humidity.

I recently had the opportunity, through the kindness of the Counsellor of Medicine, von Treyden, to examine the eye of a man who had died a few hours before of rupture of the spleen;—the results of this investigation were so decisive as to afford me the greatest possible surprise.

The retina adhered so firmly to the vitreous humour, that it was impossible to separate at least the greater portion of the latter, except by actual cutting with scissors; while, it is well known that soon after death a fluid usually collects between the retina and the hyaloid membrane, which renders the removal of the vitreous humour from the retina extremely easy. It was already perceptible to the naked eye, that the place of the yellow spot arose in a conical form, considerably above the surface of the retina. The size of this elevation I was unable to measure distinctly. I was, however, enabled, with a magnifying power of three hundred linear, to perform one entire turn of the screw of the micrometer, in order alternately to bring into focus the highest point of the yellow spot, and the surface of the retina lying beneath it.

With the view of preserving the object as entire as possible, I did not compress it strongly, but placed over it a very thin plate of glass a quarter of an inch in size, in order to level the conical elevation. The appearance which the yellow spot now presented most nearly resembled the shagreen formerly used by stationers for the covers of cases, &c. Elongated, rounded particles, gradually tapering towards the middle, and about one-fourth or one-fifth the size of particles of marrow (markkörperchen), arranged themselves together with great regularity on the remainder of the surface of the retina. They proceeded like radii towards the periphery of the yellow spot, became larger at that point, but less distant in their outline, and with them were associated the marrow-like particles of the remainder of the retina, in gradual transi-

tion. This point of transition (the circumference of the yellow spot) was not circular, but the marrow-like globules radiated rather farther in a star-like form at single points, which were not situated at regularly recurring distances. A complete measurement I was unable to effect.

I had the opportunity of submitting this observation to the Physician General, Dr. Linden, who expressed himself perfectly assured of its correctness. It appears to me to be so far important that it affords the means of a simple and mechanical explanation of the phenomenon, that a portion only of the retina, namely, that which answers to the posterior part of the axis of the eye, possesses the power of distinct vision.

Hints to Microscopists.

II.—ON THE CULTIVATION OF VALISNERIA, CHARA, ETC., FOR MICROSCOPIC PURPOSES.*

By Cornelius Varley, Esq.

I OFFER the following remarks as the result of my experience to those microscopists desirous of preserving the different *Charas, Valisneria,* and *Hydrocharis,* or Frog bit; in all of which the circulation may be well observed.

In cultivating these plants, it is only requisite to take notice of the circumstances under which Chara naturally thrives, and to imitate them as nearly as practicable.

Firstly. The Chara tribe is most abundant in still waters or ponds that never become quite dry; if found in running water, it is mostly met with out of the current, in holes or side bays, where the stream has little effect, and never on any prominence exposed to the current. If the Chara could bear a current, its fruit would mostly be carried on and be deposited in holes; but it sends out from its various joints very fine long roots into the water, and these would by agitation be destroyed, and then the plant decays; for although it may grow long before roots are formed, yet when they are produced, their destruction involves the death of the plant. In order, therefore, to preserve Chara, every care must be taken to imitate the stillness of the water, by never shaking or suddenly turning the vessel. It is also important that the Chara should be disturbed as little as possible, and, if requisite, it must be done in the

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* In a letter to the Editor.

most gentle manner, as, for instance, in cutting off a specimen, or causing it to descend in order to keep the summit of the plant below the surface of the water.

Secondly. Imitate the freshness of the water, by having an extent of surface, which it is requisite to skim frequently, or suffer it to overflow by the addition of more water. These precautions being attended to, a clear bright surface is kept. It is also desireable to change a small portion of the water; but this should be done without agitation. The best vessels for cultivating this plant in, are either wide pans, holding three or four gallons, or glass jars a foot or more high; into these the Chara may be placed, either with clean water alone, or a little earth may be sprinkled over it, so as to keep it at the bottom, or the bottom may be covered one inch with closely pressed mould, in order that the water may be put in without disturbing it. On this lay the Chara, with a little earth over the lower ends, to fix it. By causing the water to overflow is the readiest way to skim the surface, though dipping out gently will do; but in all cases of pouring in water, hold something, such as a saucer or flat piece of wood, to receive the pouring, and make it spread instead of allowing it to descend at once on the surface. Pans in the open air, nearly full of water, will be kept in order by the wind and rain, only taking care to supply the deficiency, (the effect of evaporation) and to change some of the water, if it be considered necessary. The vessels kept in-doors have a film which is always forming on the water, and which requires to be frequently removed.

Thirdly. Imitate the equal temperature of its native holes, by sinking the pan a little within the earth; but, during frosty weather, keep the pan in-doors, and at the lower part of the house, as this situation is generally the most uniform in its temperature.

The Chara will live in any temperature above freezing, and grows quicker as the warmth increases; but above the earth, as outside of a first-floor window, it will not bear the daily difference between the mid-day sun and the cold of sun-rising.

The glass jars I keep within the house, as nearly uniform in warmth as convenient.

Similar care is requisite for Valisneria, but the warmest and most equal temperature is better suited to this plant. It should be planted in the middle of the jar in about two inches deep of mould, which has been closely pressed; over this, place two or three handful of leaves, then gently fill the jar with water. When the water requires to be changed, a small portion is sufficient to change at a time. It appears to thrive in proportion to the frequency of the changing of the water,

taking care that the water added rather increases the temperature than lowers it.

The natural habitat of the Frog-bit is on the surface of ponds and ditches; in the autumn its seeds fall, and become buried in the mud at the bottom during the winter; in the spring these plants rise to the surface, produce flowers, and grow to their full size during summer. In order to keep them for microscopic purposes, large pans, with earth at the bottom, will preserve them through the winter; and if left out of doors during the cold months, the pans should be sunk into the ground to preserve the buds from the extreme cold.

Extracts and Abstracts from Foreign Journals.

[From *Oken's Isis*, 1839.]

Mandl has discovered a new spermatic animalcule in man. It has a knot-like ganglion behind the head, while others seem to resemble the spermatic animalcules of the mouse. The seminal fluid was probably vitiated by indisposition.

Doyère observes as follows on an animalcule found in the sand procured from gutters in the roofs of houses, forwarded to him by Schulze:—It is not *Macrobiotus hufelandi*, though in some particulars it much resembles that animalcule; he however considers it to be the same in more advanced age, and to be identical with Spallanzani's *Tardigradus*, not so long but thicker than *Macrobiotus* (280,012 mill. meter); it has a somewhat substantial and red-brown skin, and a head with two obvious pairs of appendages like antennæ. The body consists of four rings, each having a pair of feet attached, and three rings, with a pair of long threads or spines on the upper ring. The feet are jointed, and have four equal claws—not two divided ones like *Macrobiotus*. The proboscis is protrusible, and consists of three portions; the points of the jaws are not bent but straight.

Among the same sand were many smaller individuals of *Macrobiotus*, probably younger ones; they had only three claws on the feet, of which two were simple and one divided. This is probably the *Trionychium* of Ehrenberg.

Turpin states that in the yeast of beer the so-termed slime actually consists of small Fungi, in a state of vegetation, including *Mycoderma* (Hygocrocis) *cerevisiæ*, *Torula cerevisiæ*. Fermentation is a kind of vegetation of these plants in water. *

Morren on the structure of *Agaricus epixylon*:—The colouring matter presents characters different from those of the flowering plants. There is no skin on the covering of the Fungi. The tissue is similar to that of flesh, and consists of a net of long transparent vessels, which, on

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* A translation of Turpin's paper will be inserted entire in a future number.—Ed.

the whole, appear altogether of a full blue colour, but under the microscope present only here and there blue globules, $\frac{1}{300}$th of a millimetre in size. They are not altered by death. The fungi cannot, therefore, be reckoned among cellular plants.

In Agaricus epixylon there are no single cells. The tissue consists of anastomosing vessels, commonly furcated, occasionally three cornered—sometimes jointed, with young branches proceeding from the joints. The tubes are often united by a cross band like the letter H. The *vasa laticifera* most nearly resemble these. This structure is common to all Fungi. Thus it is a regular branched vascular structure.

The *vasa laticifera* are simple elementary organs which form together the circulating apparatus of plants. The tissue of the Fungi is distinguished by the felt-like structure, and by the want of circulation, at least during great part of their existence, as well as by the minute globules in the fluid. This last fact is characteristic of the Fungi.

Milne Edwards on the Breathing Organs of Oniscus and Tylos.—In the latter of these, the large transverse foleaceous appendages of the abdominal feet, have on the lower side a series of eight or nine air-holes, through which the air passes into as many small organs of breathing, which lie in the long foleaceous vesicles, the surface of which is full of tubular and ramose elongations. These float in the chyle of the animal, and assume an intermediate form between the respiratory organs of the spider and the air-tubes of the carp. In *Oniscus* and *Porcellio*, the anterior leaves of the first two pair of abdominal feet, have several irregular apertures beneath the hinder margin, observed by Latreille, respecting which Edwards has shown, that the air penetrates through them to a branched organ in the interior of the appendage, as in Tylos. A classification of the crustacea, founded on their respiratory organs, would, therefore, not be natural.

[From *Valentin's Repertorium*, 1840.]

Stiebel on Lysogonium tænioides.—This creature, found by Stiebel in the deposit of certain mineral springs, is thus described by him: — It appears under the microscope as a very long articulated body, enveloped by a mucoid or transparent covering, the articulated portions being connected together by a straight band or muscle running along on both sides. Each portion is divided by a transverse canal, running between and below the mucoid envelope, and which has a small opening close to the straight muscle before-mentioned. The extremities of the body are oval-shaped, and the creatures are aggregated in bundles, adhering together by means of a sort of slime. Sometimes one of the bodies projects beyond the mass, or moves in an oscillating manner. At its anterior extremity (which contains less granular matter), a distinct articulated head is seen, having a dark notch laterally, which is the mouth; this opening, when viewed dorsally, as it were, appears triangular, and from which a proboscis is sometimes seen to emerge. A delicate triangular appendage or *feeler*, is seen projecting on each side (or

even two on each side), especially on the smaller creatures, which consist of only one or two articulated pieces. The proboscis is provided with muscles, proceeding from the main lateral ones, and both at the anterior and posterior extremities of the body, placed upon small pedicels, to which a delicate black nerve is seen running, black eyes are visible. Each articulated portion is round, and provided with a black, often zig-zag formed nervous fibre, and contains vesicles and granules of various sizes. A black stomach and delicate intestine is also to be found. Propagation is effected by self-division or separation of the articulated portions.

Nasse on the Nerves of Frogs—The appearance of the nerves of a frog, which had been kept for a whole year without nourishment, and in which emaciation was considerable, was quite normal. The fibres of the ischiatic gave, as the ratio of thirty-six measurements, 0,000367″. In a healthy frog, the ratio of thirty measurements of the fibre of the ischiatic, was 0,000374″.

Fricke has observed species of *Acephalocystus* in the bones of the Pelvis of a man sixty years of age. *Estlin* species of *Cysticœcus* between the conjunctival and sclerotic coats of a girl six years old; and *Gervais* makes mention of an *Echinococcus* being found in a Simia.

Glüge has examined, microscopically, *ramollissement* of the brain. According to him, in that kind of ramollissement where the softened portion is devoid of colour, and which is comparatively rare, the primitive nervous fibres are broken up, and contain sometimes a small quantity of pus, and fewer of the small bodies or granules which are observed in the *red* softening. These last are considered by Glüge as analogous to what he calls his *globules of inflammation;* whilst Valentin looks upon them as approaching to the particles of the general pigment of the body, though, nevertheless, differing from them. According to Glüge they can be demonstrated within the capillary vessels of the substance of the brain itself. Extravasation of blood may cause, ramollissement in two ways,—first, in a purely mechanical manner, and secondly, by the absorption of its coloured serum.

[*From the Revue Zoologique*, 1840.]

Bourjot on the Structure of the Eye of Hirudineæ.—At the Philomatic Society of Paris, 26th March, 1840, M. Bourjot endeavoured to prove that the structure of the eye in Hirudineæ, is complete, inasmuch as it consists of a choroid coat and a perfectly round crystalline lens, as is the case in all animals which live in water. Thus, contrary to the opinion of M. de Blainville, and the doubt expressed by M. Moquin-Tendon, in the Monograph of Hirudineæ, M. Bourjot establishes, that the eyes of the common *Nephelis*, and of *Clepsina punctata*, which approaches near to Planaria, and with greater reason to the higher order Hirudineæ, have eyes appropriately adapted for vision.—*p.* 120.

Milne Edwards on the Spermatophora of Cephalopods.—The spermatophora are bodies discovered by Swammerdam and Needman in the male organs of Cephalopods, and which, when they are removed from the membranous pouch where they are arranged side by side, exercise some degree of motion, change their form and soon burst. M. M. Edwards and Peters have observed them in several Cephalopods, and give, as the result of their researches on these singular bodies filled with spermatic animalcules, that they are instruments of fecundation of a new description altogether, having their analogues in the fecundating corpuscules of the grains of the pollen of plants, which burst when they come in contact with the female organ (stigma) of the flower.—*p.* 153.

Guillot on the Acephalocysts of the human body.—At the Philomatic Society of Paris, June 13, 1840, M. Natalis Guillot, made known the results of his observations on these bodies. He explained the development of vessels on their walls, their communication with the neighbouring parts, and the transformation of the *Acephalocysts*, into *true cysts*, provided with vascular parietes.—*p.* 180.

Laurent's researches on Spongilla fluviatilis.—At the Philomatic Society of Paris, June 19, 1840, he endeavoured to prove that four kinds of reproductive organs existed in this species, viz.:—1. *Oviform bodies*, already known, ejecting a glutinous substance they contain, and in which no silicious spicula are found at the moment of expulsion from the egg.—2. *Gemmiform bodies*, very imperfectly known in Spongilla, called by Dr. Grant *ovules* (in sponges) which, at the moment they detach themselves from the tissue of the parent to float about, have silicious spicula in a part of their substance.—3. *Proteiform bodies*, which detach themselves from young Spongillæ, a few days after they have become fixed, and after having slowly moved for an indefinite period, fix and become developed. These bodies never contain silicious spicula at the moment of separation from the young parent.—4. *Tuberculiform bodies*, which may be seen to shoot out from different points of Spongilla, and die without producing either of the three above-named reproductive bodies. At the period they are given off, they never contain silicious spicula. These four reproductive organs of Spongilla are, however, reducible to three principal kinds, known by the names of *eggs* (oviform bodies), *gemmæ* (gemmiform bodies, which are ultimately free gemmæ, and tuberculiform bodies regarded as fixed gemmæ), and lastly *fragments* or the proteiform bodies which naturally separate from the parent.—*p.* 190.

M. C. Mylius on Uric Acid in the Excrement of Snails.—M. C. Mylius of Berlin has discovered, that the excrement of snails always contains uric acid. According to his experiments, this acid is secreted in a solid form by a glandular organ, situated directly beneath the shell, forming, without doubt, the urinary organ. This matter, which is of a white colour, is easily seen in the transparent skin. To collect it, cut the organ, and the matter escapes, which partakes of the consistence of paste or bouillie. When it is collected from a number of snails, agitate

it in water; this separates the albumen, while the uric acid is deposited, presenting, not a crystalline form, but a soft powder, like that of Lycopodium. The granules of this powder present, under the microscope, a spherical, transparent, and variable size, the largest measuring 0.00014″, the smallest 0.00006″, and the mean 0.00010″ of an inch. A grain and three quarter of uric acid may be obtained from a common snail.

Mylius has met with this acid in *Helix nemoralis* and *H. hortensis*, but has never been able to meet with it in the genera *Lymneus* and *Planorbis*. The acid is neither combined with ammonia or any other alkali, but is secreted in a state of purity by the secreting organ.—*January*, 1841.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

May 27th, 1841.—*Professor Owen, F.R.S., &c. President, in the Chair.*

After the preliminary business of the meeting, the Secretary proceeded to read a paper from Dr. Haro of Metz, being "Observations on the production of Infusoria;" but as the author did not appear to be aware of what had previously been done by other philosophers connected with the history of the subject, we content ourselves with giving only the conclusions arrived at by the author, viz.—1. That the air is not in all cases the vehicle of the germs of true animalcules. 2. That substances in a state of putrefaction, only contain animalcules when in contact with other substances in which they already exist, and that they are not developed, except under certain circumstances. 3. That decomposition of organic matter only gives birth to rudimentary species, *Vibriones* and *Monades*, which, generally speaking, are not animals; and that if true animalcules can be observed in them, these can only be regarded as larvæ deposited in their substance by minute insects flying in the air, such as occur in the vibrios of paste and vinegar; that, consequently, there is not here any spontaneous generation, properly so called. Finally, that all other particles are rudimentary crystalline atoms, which are detached from organized bodies under decomposition, and are put in motion by electrical forces, until the aggregation of the molecules constitutes them solid bodies, under the form of the crystals which the substance affects to which they belong.

The most important fact detailed by Dr. Haro was, as Dr. Arthur Farre observed, the test for discovering the presence of albumen and fibrin, should it prove on repetition to be correct. Dr. H. states, that when *albumen* is subjected to decomposition in water *Monades* are produced; and, on the contrary, when *fibrin* is so treated, *Vibriones* are the animalcules met with in the fluid.

Professor Owen also made some remarks on the communication, in which he stated that the author could not have been acquainted with the previous researches of Professors Ehrenberg, Schultz, &c., and that

the question involved the animality of *Monades* and *Vibriones*, bearing more particularly on the question of spontaneous generation as restricted to Entozoa and Animalculæ.

The meeting then resolved into the conversazione and examination of objects.

Microscopical Memoranda.

Mandl on the Relations which exist between Blood, Pus, Mucus, and Epidermis.—The general conclusions arrived at by the author in his memoir read before the *Société Medicale d'Emulation, June 3rd,* 1840, are as follows : — 1. The fibrinous globules of the blood, the globules of mucus, and those of pus, are identical. 2. All the globules are the product of the coagulation of the fibrin in the serum, which has transuded through the walls of the blood-vessels. 3. The liquid in which the globules swim constitutes the difference between pus and mucus. 4. If the fibrinous globules remain fixed to the surface of the membrane, where they are secreted, they become the nuclei of epidermoid cellules, which constitute the elements of the epidermis. 5. If, on the contrary, the fibrinous globules remain free on the surface of the membrane, they are expelled by the organism, and form an element of pus and mucus. 6. These two elements are simply filtered blood; that is to say, they contain all the elements of the blood, except the globules; the serum at the same time undergoing chemical alterations. — *Gaz. Med. de Paris, July* 1840, *in Brit. and For. Med. Rev. Jan.* 1841.

Locality for Craterium pyriforme.—This beautiful microscopic Fungus, which was first noticed by Mr. C. G. White on flint stones in an old gravel pit at Old Ford, near Bow, Middlesex, is now to be found most abundantly on the gravel pebbles on the banks of the South West-India Dock, and no doubt in other localities at this season. They are not restricted to pebbles only, nor found on every stone, but appear chiefly on the South Western aspect.—*Edward Stock, Poplar, June* 15, 1841.

Death of M. Turpin.—It is with much regret we record the death of this distinguished microscopic observer and draughtsman. His remains are deposited in Perè la Chaise, Paris. In a future number we intend inserting an abstract of his researches, and further details connected with the life of this illustrious observer.

XIX.—NOTICE OF THE ANIMALCULES OF THE RED SNOW.*

By Dr. C. Vogt.

The researches of Mr. Shuttleworth, published in the *Bibl. Univ.* 1840, on the colouring matter of red snow, show, that the red-coloured snow of our Alps is not solely vegetable, but that it contains a great number of animals. But the observations of this botanist, although very exact, have not since been repeated a sufficient number of times, nor in a sufficient number of localities, to view them otherwise than the first steps towards facts, which throw a new light on the study of the microscopic Fauna. A number of details remained for further investigation, and as M. Agassiz made a prolonged visit at the glacier of the Aar, we took with us Ehrenberg's great work on Infusoria, and two microscopes, with a view to study the red snow in a fresh state, and to compare the same from different localities, wherever it was to be met with. The results we have obtained are by no means unimportant, as regards the new and curious forms that we have discovered, and the observations we have made on their mode of life, and the facts connected with the development and reproduction of these extraordinary beings, of which their presence in the midst of the eternal snow is in some manner a *dementi* given to the general ideas which are admitted on the conditions of the existence of organic beings. The circumstance which surprised us more than all, was the diversity of form exhibited by individuals collected from various localities. It is probable that each station possesses beings proper to it, associated with a certain number of other types more generally distributed.

The red snow was found this year (August 1840) in great abundance on the glaciers which descend in the valley of the Aar. We also observed it at the extremity of the glacier of Oberaar, on the glacier of Finsteraar, on the plains of snow which border the west flank of Siedelhorn, and in numerous points of the lower glacier of the Aar, between others near to that of Abshwung, in the neighbourhood of the hotel of Neuchatelois, near the crystal grottoes, on the lower glacier of Grindelwald, &c. The following are the organisms which we met with in these situations: —

1. The Infusoria called *Astasia nivalis* by Shuttleworth, see the 3rd

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* From the Bibl. Univ. de Geneve, 21st May, 1841.

fig. in his plate. It is easily distinguished by its pyriform shape, and the rapidity of its movements. With the exception of the very small white vesicles, situated in the interior of the body, which look like stomachs, Shuttleworth has not given a description of the structure of the animalcule. Numerous observations have satisfied me, that it is enveloped in a carapace which encases the whole, and is only open at the anterior extremity. This opening is furnished with numerous small cilia, serving both as organs of locomotion and prehension. It is doubtless at this point that the mouth is situated, the position of which is indicated by an orange-coloured tint, which is clearer than the rest of the animal. The presence of the carapace together with the cilia, are characters which do not allow this animal to be placed with Astasia, as Shuttleworth has done; on the contrary, it ought to be placed in the family Peridinia, which Ehrenberg thus characterizes: *Animal distinctly, or to all appearance polygastric, without intestinal canal, having a carapace, with hairs or cilia scattered over the body, or on the carapace, often in the form of a girdle or crown, provided with a single aperture in the carapace, and furnished with vibratile organs.* It ought, otherwise, to be regarded as the type of a new genus, characterized by the absence of a groove in the carapace, and also that the stiff hairs are replaced by soft cilia, which is not found in any other genus of the family.

2. The *Gyges Sanguineus* of Shuttleworth, see his fig. 4. I will add, to complete the description given to this animal by the author, that I have frequently noticed, in those individuals in motion (Shuttleworth could only have seen dead individuals), the orange-coloured organs occupied the space between the carapace and the body, and which I believe to be the retractile lips *(lévres.)* The animal moves slowly, although directed in every case. But that which distinguishes it above all, is its mode of reproduction; it gives off from several parts of its body small transparent buds, apparently vesicular, and for the most part filled with a *grenue* substance. As they enlarge, they are detached more or less from the body of the animal; sometimes two bodies of equal size, of which one is red and carapaced, and the other quite colourless, adhere by a very narrow point of attachment. By degrees this bud completely detaches itself from the parent body, and appears under the form of a colourless infusory animal, such as Shuttleworth has represented in his 7th and 8th fig., which approaches to *Pandorina hyalina* Ehr. I could not discover in these offsets anything beyond that which Mr. S. has already seen; they are perfectly motionless; their contents apparently *grenue*, become coloured by degrees from green to yellow, orange, and even a deep red, whilst the covering remains colourless, and is

converted into a carapace. It is at this point only that the motions of the animal become visible. I had the good fortune to observe, and to be able to make drawings of the various grades of this mode of reproduction, and I am convinced that this animal, far from belonging to the genus *Gyges*, on the contrary, ought not only to be looked upon as the type of a new genus, but still further, to constitute a family, on account of its very peculiar mode of reproduction and development.

3. I place in the genus *Gyges* of Ehrenberg another infusoria, of an equally remarkable form, which does not appear to have been observed by Mr. Shuttleworth. In the red snow may be occasionally seen globular organisms, containing in their interior from two to five individuals, enclosed in a carapace apparently of a vitreous character. The colour of these animals, thus living in the same case, is of a dark red; they frequently adhere one to the other, and arrange themselves in the form of a cross; they are also frequently separate. The small individuals, probably the young, were of a clear yellow hue; I could not observe the slightest motion in them.

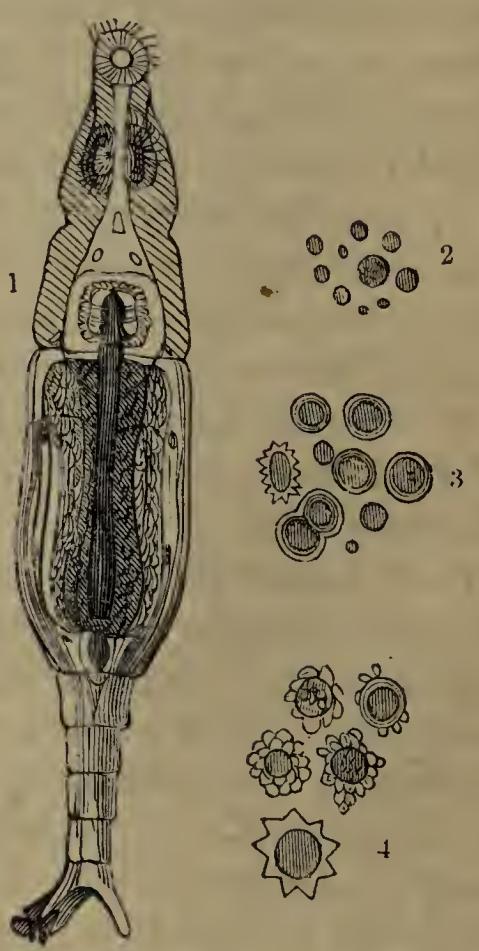
4. An infusoria of the family of *Bacillaria*. It is very abundant in the red snow, and is the smallest of all the kinds I have met with. We frequently saw two of them adhering together, and ready to separate. Their colour is yellowish brown. With the exception of a few bright spots in their interior, I could not distinguish their structure, neither could I detect the slightest motion.

5. A species of *Aretiscon*, having two hooks to the feet. This animal, known under the name of *Macrobiotus*, has usually the intestine filled with several organisms met with in the red snow, and is that which gives it a red hue, whilst its natural colour is a light brown.

6. The most interesting animal of the red snow is a Rotifer, a variety of *Philodina roseola* Ehr. We met with it abundantly in the snow of the lower glacier of the Aar. Having remarked that the ovary was of a much deeper colour than the other parts of the body, I directed my attention especially to this organ, and I was not long before I perceived eggs in different periods of development. The young eggs were perfectly round, and of a deep red hue, absolutely similar to the globules of Protococcus, described and figured by Shuttleworth, in his fig. 2. I also found eggs with a thin transparent covering, furnished on all sides with small pointed projections. After a time others were also observed, of a larger size, but similar in form to those figured by Ehrenberg, and ready to be deposited. The great similarity of the immature eggs with the globules of Protococcus figured by Shuttleworth, attracted our attention, so much so, that at the moment the idea suggested itself, that these

globules were generated by the Philodina, and are to be found in the glandular appendages of the intestines. To assure myself of this, I fed some Philodinas with indigo, and by this I distinctly ascertained that the globules in question were situated exterior to the intestinal canal. But as very many of these same globules were found isolated in the snow, it became a matter of doubt whether those were the eggs of Philodina, or really those of Protococcus. I soon found the solution of this problem, by observing one of the Philodinas in the act of voiding the eggs; from that time it was evident that these animals do not always deposit eggs fully formed, but that they give out occasionally some not perfectly developed, and these are doubtless the globules, which, up to the present time, having been considered as those of Protococcus, are really animal organisms, the eggs of Philodina. When they are of a rosaceous tinge, I look upon them as winter-eggs, analogous to those of many of the Rotiferæ, which Ehrenberg has figured at their full development. I afterwards met with these several forms of eggs together with the Philodina, in the crevices of a polished rock below the glacier of Rosenlain, in the vicinity of Guttannen, and even on the borders of the lake of Neuchâtel, where the *Philodina roseola* with coloured eyes is very abundant.

After what has been stated, if there really exists Protococcus independently of these eggs (which does not appear to me likely, at least in the red snow of the Alps), it must prove that their identity is such, as to be mistaken the one for the other. Future researches may probably elucidate their distinguishing characters; for M. Joli, in his work on the salt-water ditches of the south of France, regards equally as Infusoria, those microscopic bodies which Turpin determined as belonging to the genus Protococcus.



In the accompanying figure, 1, the *Philodina rosea* * of the red snow, with the different forms of its eggs, is seen magnified 360 diameters. The animal is

* The animal is here represented only *one half* the size as in the original plate,—the eggs are the full size.

seen from above, the body extended as in the ordinary act of progression on the bottom or side of the vessel in which it is kept. The three principal regions of the body are very distinct: 1. The head and neck, with the different organs of sense, and the commencement of the digestive system; 2. The trunk, which is nearly cylindrical, and is enveloped in a furrowed cutaneous carapace; 3. The articulated feet.

The anterior extremity, with its cilia, is expanded as in the act of touching; the rotatory organs are contracted: a little posterior to these may be seen in the median line, the respiratory tube, which is equally contracted, when spread out, it is much longer, and is furnished at its extremity with stiff cilia. Behind this tube the eyes are met with, which are obliquely placed; they are colourless in the variety from the Alps, whilst they are red or yellow in the common variety. Next comes the pharynx, with its two teeth, from whence the intestinal canal proceeds, which, in the figure given by Dr. Vogt, is of a blue colour, the animal having been fed on indigo. The intestinal appendages are distinguished from the ovary by their intense red colour. The foot, capable of expansion and contraction, is also seen. It is composed of seven rings; the fifth and sixth are armed with two points, the seventh is furnished with two claws, very much analogous to the posterior feet of the *Chenilles*. On either side of the body may be seen, in four different places, the organs which Ehrenberg described as vibratile branchiæ, but which in reality are nothing more than enlargements of two lateral vessels given off from the respiratory tube, and furnished with cilia. Similar vibratile enlargements are seen at the union of the neck with the body, in two situations in the middle of the body, and one at the side of the anus. The head and neck, as well as the feet, may be withdrawn into the coriaceous carapace of the body, which is susceptible of considerable dilatation and contraction. Fig. 2 represents those imperfectly developed eggs which have been mistaken for Protococcus. Fig. 4 shows the form of the winter-eggs not developed, with the covering in the form of a rosette; both the one and the other are met with in red snow. Fig. 3 represents an accumulation of the ordinary eggs of Philodina, collected from the crevices of the polished surface below the glacier of Rosenlain; the number is by no means limited.

The red snow of the upper glacier of the Aar and that of Siedelhorn, furnished us with Philodinas and eggs of different forms, similar to Protococcus. The lower glacier, and that of Finsteraar, presented us with all the organisms noticed in this communication.

XX.—Ehrenberg's conclusions on the organic composition of chalk and chalk marl.*

1. Many, and probably all, *White Chalk Rocks* are the produce of microscopic coral animalcules, which are mostly quite invisible to the naked eye, possessing calcareous shells of $\frac{1}{24}$ to $\frac{1}{288}$ line in magnitude, and of which much more than one million are well preserved in each cubic inch, that is, much more than ten millions in one pound of chalk. †

2. The *Chalk Marls* of the Mediterranean Basin are the produce of microscopic Infusoria, possessing silicious shells or cases, mostly quite invisible to the naked eye, intermingled with a small proportion of the calcareous animalcules of the chalk.

3. The peculiar state of aggregation in *White Chalk* does not arise from a precipitate of lime previously held in solution in the water of the sea, nor is it the result of the accumulation of the small animalcules, but it proceeds from a disintegration of the assembled microscopic organisms into much minuter organic calcareous particles; the reunion of which into regular, elliptical, granular laminæ, is caused by a peculiar crystalloid process, which may be compared to crystallization, but is of a coarser nature, and essentially different from it. The best writing chalk is that in which this process has been developed to the greatest extent.

4. The compact limestone rocks, which bound the Nile in the whole of Upper Egypt, and extend far into the Sahara or Desert, being neither white nor of a staining quality, as well as the West Asiatic compact limestone rocks in the north of Arabia, are, in the mass, composed of the coral animalcules of the European Chalk. This affords a new insight into the ancient history of the formation of Lybia from Syene

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* Extracted from Mr. Weaver's View of Ehrenberg's Observations on this subject in the Annals of Natural History for June, 1841, p. 305.

† It is to be understood that I speak only of such Polythalamia as are well preserved, wholly disregarding their fragments. Of the well preserved there are contained in one-fourth part of a cubic line, or in one-twelfth of a grain of chalk, frequently 150 to 200 in number, equal to 600—800 in each cubic line, or 1800—2400 in each grain, and from 1,036,000 to 1,382,000 in each cubic inch; and hence in one pound of chalk the number far exceeds ten millions.

The larger Polythalamia and Bryozoa of the Chalk are best obtained from the sediment produced by brushing the chalk under water; the entirely microscopic forms remain long suspended in water.

to the Atlas, and of Arabia from Sinai to Lebanon, thus opening a large field to organic distribution.

5. Many of the chalk-like formations bordering on the Mediterranean in Sicily, Barbary, and Greece, really belong to the period of the European chalk-formation, as proved by their organic contents, although commonly held to be different from the chalk, and considered as tertiary. *

6. The chalk-beds of the south of Europe, around the basin of the Mediterranean, are distinguished from those of the north and east of Europe, by numerous well-preserved chalk animalcules, and less numerous inorganic laminæ; while in the north and east of Europe these relations are reversed. †

7. In the south of Europe the beds of marl which alternate with the chalk, consist of silicious shells of Infusoria, and flints are wanting; while in the north of Europe beds of flint alternate with the chalk, and marls with Infusoria are wanting. This exchange of character tends to explain the peculiar relation of flint to chalk, indicating that the pulverulent silicious particles of Infusoria have been converted into compact nodules of flint.

8. It has been lately remarked, that the chalk which contains flint is deficient in numerous silicious Infusoria, when compared with the Bilin slaty Tripel, or polishing slate *(Polirschiefer)*, containing semi-opal; but this deficiency now disappears, and a rich substitute takes its place, the Infusoria in the north of Europe having been employed in the formation of flints; while in the south, remaining unchanged, they are preserved in the Infusoria marls.

9. The chalk animalcules most resemble those of the sea-sand and the Miliolites, which, up to the present day, have been ranged among the Molluscs with the Cephalopods; but neither of these are either Cephalopods or Molluscs, nor even Infusoria, as asserted by a late observer; but they are Bryozoa, animals of Moss-corals, which are most nearly related to Flustra and Eschara.

10. The sea downs of some, and probably of most coasts, are still in

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* In Sicily, however, there occur many breccias of chalk, which have suffered a subsequent change, and may be referred to the tertiary epoch.

† Thus in the white and yellow soft writing chalk of the north of Europe, the inorganic crystalloid portions sometimes equal, or rather exceed in mass the organic remains; but in the south of Europe, in Sicily, these organisms, with their fragments, are greatly predominant, consisting, as it appears, exclusively of well preserved Polythalamia.

course of formation by living Bryozoa, which, though very small, resembling grains of sand, are yet, for the most part, larger than the chalk animalcules, and a large proportion of the sand of the Lybian Desert has been proved to consist of such grains. It is only in Nubia above Syene that the desert sand becomes a pure detritus of granite. *

11. In the various countries of the earth in which occur white and earthy, as well as coloured and compact rocks, composed of microscopic calcareous animalcules, the genera and species of these animalcules present so striking an agreement with those of the white chalk of Rügen, that they may well be deemed characteristic of one and the same period of geological formation. It cannot be asserted for a certainty, that the same forms have been observed anywhere else.

12. In the beds adjacent to, and more ancient than the chalk, namely, in those of the Oolite and Jura limestone formation, we have also clear evidence of the existence of other microscopic Polythalamia. These, however, are such as have not hitherto been found anywhere in the chalk.

13. The early assertion that *all* limestone was the produce of animals,† though resting on no sufficient foundation, and therefore justly held in slight regard by modern geologists, yet now deserves every attention, since it clearly appears that a limestone formation widely extended on the surface of the earth is composed of microscopic animals, visibly converted in a gradual manner into inorganic chalk and compact limestone. If similar phenomena appear also in the Jura limestone formation, and should become still further confirmed, these considerations (combined with the long-known existence of coarser corals and shells in both formations), tend to show how necessary it is, when examining the composition of any considerable portion of the solid mass of the earth, to strengthen our natural senses by artificial means, in order to obtain a distinct knowledge of the extent to which organic life may have contributed to its production.

14. The extreme minuteness of the chalk animalcules is strikingly proved by this, that even in the finest levigated whiting, multitudes of them are still present, and may be applied, without suffering change, to the most varied technical purposes; thus in the chalk coating given to painted chambers, paper, or even glazed visiting cards (when not coated with white lead alone), may be seen a pretty mosaic of well-

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* On these very interesting and not easily-developed relations, I hope, at a future day, to be able to make a more special communication.

† By Linnæus in 1745 and 1748, and Buffon in 1749.

preserved Moss-coral animalcules, but which are invisible to the naked eye; and thus our natural vision receives from such a surface the impression of the purest white, little dreaming that it contains the bodies of millions of self-existing beings, of varied and beautiful forms, more or less closely crowded together, as in Plate IV. of Ehrenberg's work, where the subjects are magnified 300 times.

XXI.—MEMOIR OF THE LATE FRANCIS BAUER, ESQ., F.R.S., ETC.

At the Anniversary Meeting of the Linnæan Society on the 24th of May 1841, the Bishop of Norwich, President, alluded, among others, to the death of this distinguished Microscopic Observer, an account of which we extract from the Proceedings of that Society :—

Francis Bauer was born at Feldsberg, in Austria, October 4th, 1758. His father, who held an appointment as painter to Prince Lichtenstein, died while he was yet a boy, and the care of his education devolved upon his mother. So early was his talent for botanical drawing manifested, that the first published production of his pencil, a figure of *Anemone pratensis*, L., is appended to a dissertation by Störck, "de Usu Pulsatillæ nigricantis," which bears date in 1771.

In 1788 he came to England, in company with the younger Jacquin, and after visiting his brother Ferdinand, who was then engaged in completing the beautiful series of drawings, since published in the "Flora Græca," was about to proceed to Paris. But the liberal proposals made to him by Sir Joseph Banks on the eve of his intended departure, diverted him from this resolution, and induced him to remain in England, and to take up his residence in the neighbourhood of the Royal Garden at Kew, in which village he continued to dwell until the termination of his life.

It was the opinion of Sir Joseph Banks, that a botanic garden was incomplete without a draughtsman permanently attached to it, and he accordingly, with the sanction of his Majesty, fixed Mr. Bauer in that capacity at Kew, himself defraying the salary during his own life, and providing by his will for its continuance to the termination of that of Mr. Bauer. In fulfilment of this engagement with Sir Joseph, Mr. Bauer made numerous drawings and sketches of the plants of the garden, which are now preserved in the British Museum. A selection from his drawings was published in 1796, under the title of "Delineations of Exotick Plants cultivated in the Royal Garden at Kew," and this was intended to be continued annually: but no more than three

parts, consisting wholly of Heaths, and containing thirty plates, were published.

In the early part of 1801, Mr. Bauer made for Mr. Brown, who had then been for some years engaged in a particular study of the Ferns, drawings of many genera of that family which Mr. Brown regarded as new. His drawings of *Woodsia*, made some years afterwards, were published in the 11th volume of our Transations, in illustration of Mr. Brown's paper on that genus. At a later period he again directed his attention to that tribe of plants, his labours in which have within these few years been given to the world in Sir William Jackson Hooker's "Genera of Ferns." The 13th volume of the Linnæan Transactions is enriched with his elaborate drawings, accompanying Mr. Brown's memoir on *Rafflesia;* and the part published last year contains a paper by Mr. Bauer "On the Ergot of Rye," from materials collected between the years 1805 and 1809.

The plate which accompanies the last-mentioned paper is derived from drawings which form part of an extensive series in the British Museum, illustrative of the structure of the grain, the germination, growth and development of wheat, and the diseases of that and other *Cerealia*. This admirable series of drawings constitutes perhaps the most splendid and important monument of Mr. Bauer's extraordinary talents as an artist and skill in microscopic investigation. The subject was suggested to him by Sir Joseph Banks, who was engaged in an inquiry into the disease of Corn known under the name of "Blight," and the part of Mr. Bauer's drawings which relates to that disease was published in illustration of Sir Joseph's memoir on the subject, and has been several times reprinted with it. Mr. Bauer has himself given, in the volume of the "Philosophical Transactions" for 1823, an account of his observations on the *Vibrio Tritici* of Gleichen, with the figures relating to them; and another small portion of his illustrations of the Diseases of Corn, has since been published by him in the "Penny Magazine" for 1833. His figures of a somewhat analogous subject, the Apple-blight, and the insect producing it, accompany Sir Joseph Banks's Memoir on the Introduction of that Disease into England, in the 2nd volume of the "Transactions of the Horticultural Society."

Before the close of the last century, Mr. Bauer commenced a series of drawings of *Orchideæ*, and of the details of their remarkable structure, to which he continued to add, as opportunities offered, nearly to the termination of his life. A selection from these, which form one of the most beautiful and extensive series of his botanical drawings, was lithographed and published by Professor Lindley between the

years 1830 and 1838, under the title of "Illustrations of Orchidaceous Plants."

His other published botanical works are: 1. The first part, published in 1818, of "Strelitzia Depicta," a work intended to comprise figures of all the known species of that magnificent genus; 2. "Microscopical Observations on the Red Snow" brought from the Arctic Regions by Captain Ross, the globules contained in which, by some regarded as an *Alga*, he described in the 7th volume of the "Quarterly Journal" of the Royal Institution, as a species of *Uredo;* 3. "Some Experiments on the *Fungi* which constitute the colouring matter of the Red Snow," published in the "Philosophical Transactions" for 1820; and, 4. The Plates to the Botanical Appendix to Captain Parry's first Voyage of Discovery, published in 1821. One of the last productions of his pencil, illustrating the structure of a plant growing at Kew, which produces perfect seeds without any apparent action of pollen, will appear in the forthcoming part of the Linnæan Transactions.

In the year 1816, he commenced lending the assistance of his pencil to the late Sir Everard Home, in the various anatomical and physiological investigations in which that distinguished anatomist was engaged; and in the course of ten or twelve years furnished, in illustration of his numerous papers in the "Philosophical Transactions," upwards of 120 plates, which were afterwards reprinted with Sir Everard's "Lectures on Comparative Anatomy." These plates, which form together the most extensive series of his published works, embraced a great variety of important subjects, chiefly in microscopic anatomy, and afford abundant evidence of his powers of observation and skill in depicting the most difficult objects.

It is this rare, and previously almost unexampled union of the observer and the artist, that has placed Mr. Bauer foremost in the first rank of scientific draughtsmen. His paintings, as the more finished of his productions may well be termed, are no less perfect as models of artistic skill and effect, than as representations of natural objects. Of all his predecessors, Ehret alone approaches him in these particulars; among his contemporaries, none but his brother Ferdinand can be regarded as his equal.

Mr. Bauer became a Fellow of the Linnæan Society in 1804, and of the Royal Society in 1820. He died at his residence on Kew-Green on the 11th of December last, in the 83rd year of his age; and was buried in the churchyard of that parish on the 16th of the same month.

Extracts and Abstracts from Foreign Journals.

[*From Müller's Archives.*]

On the Microscopic Constituents of Milk.—Professor Nasse, of Marburg, after a careful microscopic examination of milk from pregnant and suckling women, as well as from a cow and a bitch, and a comparison of his results with those of Donné and other preceding observers, says, that the following may be enumerated as the microscopic constituents of the normal secretion of the mammary gland:—1. The smooth, homogeneous, transparent oil-globules, to which, in addition to the common milk-globules, belong also the fine, scarcely-measurable particles and the larger drops of oil which swim on the top of the milk; 2. The cream-globules, which are distinguished from the oil-globules by their opacity, and their facette-like aspect; 3. The granulated yellow corpuscles; 4. The lamella of epithelium; 5. The more or less turbid medium, in which the four preceding kinds of corpuscles are suspended.

The first, the common milk-globules, are composed entirely of fatty matter, which dissolves completely and rapidly in ether. No membrane can be seen investing them. In the first nine days after delivery, the largest globules measure $\frac{1}{200}$ of a line in diameter; afterwards they are as much as $\frac{1}{100}$, but many are found of a much smaller size, and through all periods of lactation, the microscope, as well as other means of examination, show that the proportion of oil-globules in the milk varies greatly in different persons and under different circumstances.

In woman's milk perfectly fresh and warm, no other globules than these are sometimes found; but as soon as the milk has stood for some time exposed to the air, other corpuscles are discernible in it, which are distinguished from the preceding by a greater definiteness, a less degree of polish, and an appeance of facettes. In size they are nearly similar to the oil-globules, but if the milk be examined some time after it is drawn, a number are found much larger; $\frac{1}{50}$ of a line, or even more, in diameter. They are not so easily soluble in ether as the common milk-globules; they do not break up in drying, but they become clearer; acetic acid and ammonia have no influence upon them; they diminish for a time when the milk is boiled, but they re-appear gradually as it cools again; when left at rest they collect on the surface and form the cream; they easily stick together, and butter is formed when they are collected in one homogeneous mass. It is evident that they acquire their peculiar characters after they are drawn from the gland-ducts; for the author, as he watched them on the field of the microscope, could see individual globules which were originally clear, becoming on a sudden quite dark, and assuming the several characters of the cream-globules.

The yellow granulated corpuscles are almost peculiar to the colostrum; after the first few days from delivery, they cease to occur in the milk, and they disappear from it earlier in those who have borne chil-

dren than in primiparæ. They are not all spherical, the majority are flat. Their diameter is at most from $\frac{1}{200}$ to $\frac{1}{100}$ of a line; some are found measuring $\frac{1}{50}$ in length, and $\frac{1}{75}$ in breadth. They consist of small clear globules of fatty matter, which are connected together by a firm cement, which is unalterable by either ammonia or concentrated acetic acid, or by boiling. When the milk is left at rest, these globules collect on its surface; and when they exist in considerable numbers, render it unfit for making butter. The author believes that they are not, like the preceding globules, formed by the action of the air, but that they are produced by the secreting surface of the gland-ducts, and are analogous to the mucous-cells which are cast off from the surfaces of many mucous membranes, and to which they are in many respects similar.—*Heft III. p.* 258, 1840, *Transt. in Brit. & For. Med. Rev.* 1841.

[*From Guerin's Revue Zoologique.*]

Dujardin on Sponge.—If a small portion of a living sponge be placed between two pieces of glass under the microscope, the living substance is observed grouped in irregular roundish masses, enclosing green or variously-coloured granules, according to the species under examination. These irregular masses appear at first sight motionless; but by carefully adjusting the light (éclairage), on the margin of these roundish diaphanous bodies a change in form is apparent at every moment; these isolated portions not unfrequently, by the tearing of the mass into pieces of from $\frac{1}{100}$ to $\frac{1}{200}$ of a millimetre, move slowly in the liquid, and fix themselves on the glass by means of their mobile and diaphanous expansions, like the true *Amibes*. These isolated portions might be considered as simple green globules filled with granules, if care be not taken to view, by the aid of refraction, the borders of their expansions. Such are the facts observed by Dujardin in *Spongia panicea* and in *Clione celata* on the coast of Manche, and in the Spongilla from the Orne and environs of Paris, since the year 1835.—1838, *p.* 67.

M. Poiseiulle is of opinion, that in those tegumentary parts of the body of man constantly and habitually uncovered, such as the face, neck, hands, &c., and which are consequently subjected to a medium temperature, the capillary vessels are of a much larger size than those situated in the other parts of the skin, which conclusion he arrives at from the circumstance of the capillary vessels circulating blood increasing in volume when the temperature is lowered to the medium in which they are placed.

M. Philippe Pacini of Pistoie, read a memoir at the Scientific Congress of Pisa, on a new organ discovered by him in the human subject. It consists of ovoid corpuscles, or small white opalescent globules, about two millimetres in size, which exist in considerable number in the subcutaneous cellular tissue of the palms of the hands and soles of the feet in man.

Humboldt's Natural Wadding or Flannel.—This substance has been found in great quantity on the surface of the earth, in Silesia, after an inundation of the Oder; it is composed of a filamentous tissue of *Conferva rivularis*, and fifteen different species of Infusoria, with silicious Carapaces.

Beauperthuy and *Adet de Roseville* addressed some observations at the sitting of the Academy of Science, Paris (19th March 1838), tending to prove that putrid decomposition is preceded by the development of microscopic animalcules; these are first of the genus *Monas*, and ultimately become *Vibriones*, which multiply with considerable rapidity.

[*From the Annales des Sciences Naturelles, Jan.* 1840.]

M. P. Gervais on several Species of the Order Acaridæ. — In this paper two new species, (with figures), are added to the genus *Scirus*, viz. *S. obisium*, which is very small, not exceeding one-third of a millimetre in length, devoid of eyes, bright orange colour, and nearly transparent, &c. The other, *S. hexopthalamus*, having six eyes of a carmine colour; larger than the preceding; of an uniform orange colour. They were both found near Paris.

A species of the genus *Dermanyssus*, named from being met with on *Pipistrella*, *D. Pipistrellæ*, is also figured. Its length is about one millimetre, and is much smaller than the genus Caris. He has also figured, for comparison, *Psoroptes equi*, *Sarcoptes hominis*, and *S. dromedarii;* the latter was obtained from the scaly crust of a dromedary recently sent from Africa to the Jardin-du-Roi. No resemblance is to be perceived between that of the camel and the horse; whilst the first, on the contrary, so closely resembles that of man, that it may be mistaken for it if not examined with care; and it may be supposed, that it is to this similarity of structure that it passes from the animal to which it is peculiar, and lodges itself, with the greatest ease, conveying the disease from the one to the other. On careful examination, however, under high powers, M. Gervais considers that sufficient characters may be found to entitle it to the place of a species. In this paper the differential characters are given in detail; it is accompanied with a beautiful plate, on which seven species of the order are delineated.

Duvernoy on some points in the structure of Limulus, with a more particular description of their branchiæ.—This memoir, which is of some length, enters into the historical, descriptive, and theoretical parts of the subject.

Lallemand's paper on the origin and mode of development of Zoosperms, is inserted entire, for an abstract of which see p. 59 of this Journal. In some remarks which precede the paper, he states, that a single drop of fluid is sufficient for a perfect observation, a larger quantity being inconvenient. It is requisite to press the small piece of thin glass which covers it, to stop the currents of air there established, and to cause the bubbles of air to disappear which are there found imprisoned. Although the two glasses appear to touch, the Zoosperms move in the intervals with great freedom, as long as they have the power, and the evaporation has not proceeded to a too great extent; should this take place, a drop of water added, for some time prolongs their movements.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

June 24th, 1841.—*Professor Owen, F.R.S., &c. President, in the Chair.*

After the usual business had been completed, the Chairman stated, that the Council had given orders for three of the most perfect microscopes that can be constructed. They had therefore requested Messrs. Hugh Powell, Andrew Ross, and James Smith, each to furnish a standard instrument, made according to their own peculiar views. The meeting was also informed, that owing to professional duties, Dr. Arthur Farre had that evening resigned the office of Secretary, which he had so well filled since the establishment of the Society. A vote of thanks was proposed to Dr. A. Farre by Mr. George Jackson, for his assiduity and attention to the affairs of the Institution, which was seconded by Mr. Edwards, and carried unanimously.

The Secretary read an abstract of Dr. Haro's paper, read at the last meeting (see p. 79), which was again brought before the Society with a view to discussion.

Mr. E. J. Quekett made some remarks, and exhibited specimens of water obtained from the London Docks, which attracted his attention on account of its blood-red colour; which Mr. Q. finds, on examination, to be owing to the presence of a multitude of small Entomostracous animals, of the genus Monoculos; in the interior of the individuals of which a bright red spot was observed. They occur in vast numbers, at certain seasons only, such as in warm and very tranquil weather, and usually form about one-sixth of the bulk of the water. The common people call it *spawn*.

Mr. Cornelius Varley stated, that he had brought for exhibition specimens of *Nitella* in fructification (both the globule and the seed.) They were not quite ripe, but when they arrive at that state, he expects to meet with the same moving particles which he some years since pointed out in *Chara*.

The meeting then resolved into the usual conversazione and examination of objects.

Microscopical Memoranda.

Red and Green Snow.—In the 44th No. of Taylor's "Annals and Magazine of Natural History," is the translation of a paper from Wiegmann's Archiv. (Heft. I. 1840), entitled, "On Red and Green Snow, by the late Prof. Meyen;" from which we learn, that M. Ch. Martius, who twice accompanied the French expedition to Spitzbergen, is of opinion, that the colouring matter of red snow, *Protococcus nivalis*, and of green snow, *P. viridis*, "are one and the same plant, only in different stages of development."—Prof. Meyen, however, considers it to be still a question, whether the colours of the snow are really produced by different states of the same species; but he has no doubt but that the so-called Protococci belong, not to the vegetable, but to the animal

kingdom, being true Infusoria; that P. viridis is identical with Ehrenberg's *Euglenia viridis*, and P. nivalis with his *Euglenia sanguinea*, (the *Enchelides sanguinea* and *Pulvisculus* of authors); that these Enchelides "exhibit at times a perfectly motionless state, in which they appear spherical;" and that in this state they have been described as Protococci; that, "it is these spherical, reposing animalcules, which often appear in incredible numbers, and, surrounded with a kind of slime, form more or less thick skins, which frequently cover the bottoms of shallow standing waters;" and it is in consequence of observing that these animalcules, after long remaining in this passive and inert state, occasionally resume their activity, that so many philosophers have spoken of a metamorphosis of Infusoria into plants, and *vicè versâ*.—*Newman's Phytologist, July*, 1841.

Oberhauser's New Microscope.—Through the kindness of Dr. Andrew Ure, we were favoured with a sight of the newly constructed Microscope, invented by M. Oberhauser, optician of Paris, during his recent visit to London. We do not pretend to give any description of the peculiarities of its construction. It enables, however, the observer to see an object the size of a half-crown piece at one time, and possesses the advantage of not reversing it. The facilities which it affords to the dissector from the above improvement are equally important. On inquiry, we were informed, that the price is as near as possible £10, and facilities will shortly be afforded of purchasing them in this country. It is much to be desired that some optician, resident in the metropolis, would import the various simple improvements in Microscopes which are continually being made in Germany and France, as many of them are exceedingly good, and of a price more within the latitude of the humbler scientific inquirer. Whoever should undertake this, we promise him every support.—*Editor.*

Mode of obtaining the Wheel Animalcule, (Vorticella rotatoria.)—In all the old books, and in many modern works, directions are given to seek for this interesting animalcule in leaden gutters, when wanted for the microscope; but I never could find them in such situations, and have not been without them, in one half-pint mug, for the last seven years. My method of raising and preserving this species is the following:—Early in the spring I fill a three gallon jug with pure rain-water, (not butt-water, because it contains the larvæ of the gnat tribe.) This quantity more than suffices to fill a half-pint mug, and to keep it at the same level during the season. I then tie up a small portion of hay, about the size of the smallest joint of the little finger, trimming it so that it may not occupy too much room in the mug, and place it in the water; or about the same quantity of green sage leaves, also tied and trimmed. About every ten days I remove the decayed portion (with a piece of wire) and substitute a fresh supply. A much greater number of wheel animalcules are raised by the sage leaves; but I have sometimes been obliged to discontinue the use of it, on account of its producing mouldiness. I take them out with an ear-picker, scraping up the sides of the mug near the surface, (including the dirt which adheres to them, by the tail), or under the hay and sage.—*J. Ford. Chelsea College, June* 25, 1841.

XXII.—AN ABSTRACT OF THE "INFUSIONSTHIERCHEN" OF EHRENBERG.—No. I.

By W. Hughes Willshire, M.D., M.B.S., Physician to the Fore Street Dispensary, &c.

BEFORE presenting the readers of the Microscopic Journal with a short abstract of the great system of Ehrenberg on the Infusoria, a few prefatory remarks may not be out of place. The continued researches of naturalists into the infinitude of the organized creation, have been the means of bringing to light great numbers of living beings, of whose existence but a few years past, we had no reasonable proof. From the chilly regions of the Glaciers with their coloured snow, to the pools of Egypt with their living forms,—from the waters of the Cattegat to to the sunny waves of Mexico,—from the Bergmehl of Finland to the brown mould of Newmarket, has the inquiring mind of the naturalist drawn evidence of the all-pervading principle of life. Forms from whence the essence of vitality has long since departed, have given up their remnants from the chalk of Oran : and beings invisible to the naked eye of man have been summoned forth from their entombment in their flinty sarcophagi. The *chaos* of old systematists has passed away, and a structure of beauty has been formed from its heterogeneous materials. But with this extension of our knowledge into the forms of the veritable creation, the same veil still hovers over us as it did in past times, and the limits of the great groups of animal and vegetable existence, are in reality as little definitely marked now as they were then. The *Psychodiary* kingdom of Saint Vincent is perhaps but an equivalent to the appendage of Linnæus to his Vermes, and the generic term *Anthophysa*, but tantamount to Plante-Animale ; and even should it be laid down as an axiom ruling the existence of organic life, as philosophically deducible from our advanced knowledge of its ruling principles, that there are no rigorous limits between the two great classes, but that the beings composing them are but the consequence of certain powers with which matter has been endowed by the Creator, and that forms resulting from such powers slide imperceptibly into each other—we are but a little more bold in avowing that which before was only tacitly allowed,

Should this not be maintained, what, it may be asked, are we to do ? If the organisation of the higher forms of the world, as lately opened out to us, is redolent of characteristics wherewith to stamp its indi-

viduality; is that of the lower as abundant in its efficiency too? If the cerebral ganglia of Rotatoria are proofs indubitable; are the *foramina* of the Bacillaria, and the *green matter* of Euastrum equally satisfactory? Is the absence of gastric sacs in the Sponge and their structure of cells, and the propagation by self-division in the Bacillaria, as also in the true Confervœ, no stumbling-block in the way? Though with Closterium is seen locomotion, is it not also with Oscillatoria? Though systems of support are found in the Silicious loricæ; have not Caulerpa and Thaumasia skeletons as well? Has it not been shown by Schwann, that the law of development of which Schleiden had proved to obtain in the formation of all vegetable tissues, holds with equal truth in all the animal tissues, and that in their first periods of existence they follow the same laws of formation? Has it not been said by Turpin, that he could perceive no difference between the globules of milk from which Penicillum glaucum sprung, and the cells of animals and of plants? In fine, has in not been amply proved to us by the younger Agardh, that if the young Sponge is locomotive, the fixed Algæ are endowed with moving sporules too?

On the other hand, obscure as may be certain relationships between many of those organic creatures, whose existence is now known to us, how great and rich are the facts which are available to us as certain knowledge? Proofs of high conditions of organisation where they were never dreamed of, the beings possessing which swarm in localities never investigated before; organs of sense discoverable in moving atoms, to which the power of perception was not thought to belong; brain, muscle, and vessel, tracked out by the eye of the investigator in myriads of living beings until now not even seen.

In the short exposition of the System of Ehrenberg which we intend to follow these remarks, the amount of our knowledge of the minutest of organized beings will be seen. It is true, that many of the views of this great writer have been, and are still disputed by some; and the labours of Dujardin in France are to be cited in proof. Meyen and others in Germany have also lifted up their voices against the localization of many of the groups in the kingdom of animals, where Ehrenberg has placed them, after wresting them out of the kingdom of plants. The high development of the various sensual and other organs, has been by many doubted; and the mere systematic arrangement of the tribe, as also the propriety of its special groupings, have been canvassed. That the labours of many of the great German physiological critics have been profitably directed, cannot, I believe, be questioned; but the general value and high ability of the Infusionsthierchen, remains undisputed.

XXIII.—On the silicious bodies of the chalk, greensands, and oolites.*

By J. S. Bowerbank, Esq., F.G.S.

The singular forms presented by the tuberous masses of flint found in the upper chalk, have long induced naturalists and geologists to imagine, that their forms were derived from Alcyonic or spongeous bodies; but I am not aware that this has hitherto been demonstrated to be the actual fact. Professor Ehrenberg's observations on silicious bodies first induced me, in common with many other persons, to cause thin slices of flints to be made, with the intention of procuring specimens of *Xanthidia;* and in the examination of these slices, I was struck with the frequent occurrence of small patches of a brown reticulated tissue, which presented nearly always the same appearance. The occurrence of this tissue, combined with the circumstance of finding spicula exhibiting nearly the same form and size, and always occurring in about the same proportion, along with numerous foraminated shells and other extraneous bodies, strongly induced me to believe, that the brown reticulated tissue was a portion of the remains of the organized body, the shape of which was represented by the flint nodules; and the indications thus observed, equally inclined me to believe, that if these flints were fossil organized bodies, they would almost inevitably prove to be sponges. With these views I commenced the investigation of the flints of the chalk, and as a preliminary measure I first examined, in a cursory manner, thin slices of flint nodules from various localities, especially those from the neighbourhoods of Gravesend and Brighton, and from Hertfordshire, Norfolk, and Wiltshire; and in all of them I found a perfect accordance in the structure and proportion of the reticulated tissue, and of the spicula before alluded to, and also in the occurrence of *Xanthidia* and *Foraminiferæ*. This similarity in the structure of the flints from all the above localities, renders it unnecessary to detail the results of each examination separately. I shall therefore confine myself to the description of what may be observed, by a careful investigation, in any chalk flint, without reference to the spot from which my specimens may have been procured.

When thin polished slices of the common tuberous flint of the chalk are prepared by the lapidary, mounted upon slips of glass, and sub-

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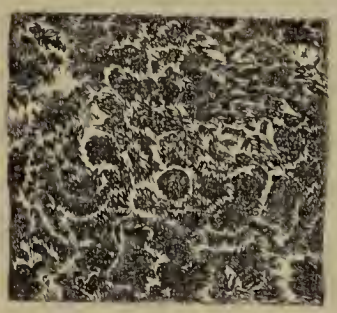
* From the Trans. Geol. Soc. Lond., Vol. VI, p. 181. Read March 11th, 1840.

jected to examination, as transparent objects, with a microscopic power of about 120 linear, it will be observed, that the appearance presented to the eye is similar to that of a thin stratum of a turbid solution of decomposed vegetable or animal matter, containing fragments of extraneous bodies, mixed with small foraminated shells, spicula of sponges, and minute animalcules; especially of that highly interesting and beautiful genus, *Xanthidium*. Amid this heterogeneous mass, there are frequently to be noticed fragments of the brown reticulated tissue, to which I have before alluded; and occasionally, if the slice be from near the surface of the flint, these patches of brown spongeous substance are comparatively of considerable size, and are dense and opaque. In this state, and by this mode of examination, the reticulated form of the structure can only be perceived at the edges of the mass. When it occurs in this well-preserved form, which is indicated to the unassisted eye by the appearance of rusty brown coloured spots on the flints, it is best examined by placing a small round black patch, about two lines in diameter, behind the spot to be examined; and then illuminated by a leiberkuhn; and viewed with a power of 120 linear, it exhibits the characters represented in Fig. 1. In that specimen, which is from a flint procured at Northfleet, near Gravesend, the structure is remarkably well preserved. The mass of the sponge appears to consist of numerous cylindrical contorted canals, which, from the uniformity of their size and the minuteness of their diameters, would appear to have been the in-current canals of the sponge. Occasionally orifices of a considerably larger diameter are dispersed in the mass, and have every indication of having been the large ex-current canals. The walls of these canals present the appearance of having been formed of a thin glairy network, bearing a strong resemblance to the reticular substance of the common fresh-water sponge of the rivers of England. Amid the mass are found spicula, comparatively speaking, very sparingly dispersed; and minute foraminated shells of many species, imbedded in a precisely similar manner to what we observe on a larger scale in the recent Mediterranean sponge of commerce.* Very



* When the above passage was written, it was generally considered that the Keratose sponges were destitute of spicula; but I have since ascertained that they are occasionally found imbedded in the larger horny fibres of the sponges of commerce, and in numerous other sponges of the same genus from New South Wales; and I have described the mode in which they occur in a paper read before the Microscopical

frequently, when but little of the reticulated substance of the sponge remains, its former presence is indicated by the silicious matter exhibiting the aspect of a congeries of gelatinous globules, evidently arising from the silex having been moulded by the tissue amid which it was deposited; and the gelatinous molecules, when traced to the edges of small patches of the spongeous texture, are found to agree in size and form with the orifices of the supposed in-current canals. In other cases, no indication of the former presence of the organized structure of the sponge remains; but its previous existence is proved by the mode in which the spicula, the foraminated shells and the other extraneous matters are found suspended, equally in all parts, and not precipitated to one particular portion of the flint, which would have been the case, had the space in which they were deposited been a mere hollow, arising from the imbedment and subsequent rapid decomposition of the body which has given rise to the peculiar form assumed by the mass; but, on the contrary, their continued suspension in their natural position indicates that the organized tissue in which they were entangled, retained its form and texture sufficiently long to allow of the infiltration and perfect fossilization of these interesting remains, in their original places. Had we no other evidence, the nature and position of these remains would have strongly indicated the former spongeous nature of the tuberous-shaped flints of the cretaceous beds. If the chalk be carefully washed from the exterior of a flint with a soft brush, and a portion of that surface be examined as an opaque object by direct light, with a miscroscopic power of about 50 linear, we shall observe it to present a peculiar saccharine appearance, with occasionally deep circular excavations; and with small fragments of shells and other extraneous matters, partly imbedded in, or only slightly adhering to, its surface. If the surface of the flint be further cleansed from the chalk, by immersion in dilute muriatic acid, until effervescence ceases, the deep circular orifices will frequently be seen to have spicula projecting from their sides; thus strongly pointing them out as having been, in all probability, the mouths of the larger ex-current canals. If small pieces, about a quarter of an inch in diameter, be now selected, presenting the roughest

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Society, Jan. 27, 1841. (See p. 8.) Since the publication of these facts, I have also ascertained, from the examination of an Australian species of Keratose sponge, which was brought by Mr. Gould from Swan River, preserved in spirit immediately after being taken from its place of growth, that silicious spicula occur in great numbers in the fleshy substance that fills up the horny network of the sponge in its live state. It therefore ceases to be an anomaly, as it might have hitherto been supposed, that silicious spicula should be found imbedded in the fossilized remains of a Keratose sponge.—*March* 1841.

and most saccharine aspect, and these be illuminated by a leiberkuhn, and examined with a microscopic power of 120 linear, under favourable circumstances, it will be seen that the surface is formed by a complex mass of small contorted tubuli, the apices of many of them being furnished with a minute perforation, as represented in Fig. 2.* The tubuli on the surface of the flint stand boldly in relief from the more solid portion of the white crust, which surrounds the dense and semi-transparent mass. If we give but a slight consideration to the circumstances under which these bodies have been probably buried, we shall at once perceive that the characters exhibited by the surface of the flints, and the state of the tissues at this part, are exactly such as we should naturally expect to be the case; for if a modern sponge of a close texture be immersed in water, in a tranquil situation, and a gradual deposit of calcareous silt, of low specific gravity, were to take place upon it, the deposited matter would penetrate the substance of the sponge to a very slight extent only, while the interior of the space would remain filled with pure, or nearly pure water, and the portions of its structure thus embraced by the calcareous deposit, would be protected to a great extent from the operation of other agents; and we might reasonably expect that, although the minute hollow tubuli might be assailed from the interior of the mass by a second and more fluid matter, and thence become silicified, yet that the space between them would be occupied by the matrix in which they were imbedded; and this is exactly what appears to have taken place during the process of the fossilization of the sponge of the common flint. The structure, both internal and external, and the peculiarities thus described, are common to the great mass of the tuberous flint nodules of all the localities of the chalk formation of England, from which I have been able to procure specimens, and under circumstances where we should have scarcely expected them to have been preserved.

The structure and other characters of the layers of tabular flint are in perfect accordance with those of the nodular flints. *Xanthidia*, spicula, and foraminated shells, are dispersed with equal abundance in its substance. The upper surface resembles, in every respect, that of the flint nodules, while the under one presents, even to the unassisted

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* A similar tubular structure of the fibre exists in the recent *Spongia fistularis*, described and figured by Dr. Grant, in Vol. II. of the New Edinburgh Philosophical Journal.—*March* 1841.

eye, a still more strongly marked spongeous aspect. Its general appearance is that of a sponge which has been built upon an irregular surface, and has followed the whole of the sinuosities. The great excurrent canals are larger and more numerous than usual; and the spicula are more abundant, frequently projecting from the surface, while the *Foraminiferæ* are attached so abundantly to it, that upon a superficies of an inch and a half square, I have counted upwards of twenty specimens of various species, some of which were attached only by a minute portion to the mass, precisely in the manner in which small bodies are frequently attached to recent sponges. It would thus appear, that the only difference between the tabular and other forms of flint was, that at the period of the formation of the tabular flint, the original sponge was built upon a firmer and less changeable surface than usual: and that under these circumstances it had obeyed its natural instinct, that of coating over any mass upon which its gemmule might have chanced to settle, in a manner precisely analogous to the habits of the fresh-water sponge of our rivers, and to many other parasitical species, which are inhabitants of the sea at the present period. Wherever the sponge had settled upon a shell, or *Echinus*, this habit of coating the body it was based upon, is strongly illustrated; but as the substance thus built upon was probably to a small extent immersed in the silt or mud, we rarely find more than half or two-thirds of the surface enveloped; and from this circumstance it is, that we detect in chalk fossils so many which are more or less imbedded in flint; and among these, instances are found, varying from cases in which the sponge-gemmule had not long settled and commenced developing itself, to where it had grown to such an extent as to have exceeded many times the size of the base, upon which it most probably at first settled. The great mass of nodular chalk flints does not exhibit any indication of a base, except in those instances where extraneous substances appear upon the surface; but this may be readily accounted for, when we consider that, probably, in the first instance, the gemmule was attached to some minute fragment of a shell or other substance, and that its further development took place while it was merely recumbent on the silt or mud; in the same manner as we occasionally find specimens of modern corals, &c., without any apparent base, the original attachment having been built over, after it had become separated or liberated. In one specimen of flint in my possession, the sponge appears to have been torn or injured, nearly at its middle, as a broad and distinct band or collar has been built round it, evidently with a view of repairing the injury, and strengthening the substance at the weakened part.

(To be continued.)

XXIV.—On the Animal of Foraminifera.

By M. Desjardins.

Desjardins is convinced that the shell is not internal, but on the contrary external, and that the animal, absolutely deprived of the organs of locomotion, and even of respiration, is composed of a set of limbs or lobes which grow and successively envelope it. The fleshy portions cannot be seen from without, except when a new limb is produced and is not yet incrusted. On breaking the shell, it may be observed that the mass of the animal is as simple as that of *Planaria* or even of *Hydra;* and by dissolving the shell by the aid of very dilute nitric acid, the entire body formed of a series of limbs which occupy the chambers, may be obtained, susceptible of being unrolled, and presenting an aspect different according to the genera. Thus in *Miliola,* the limbs have the form of sheathing leaves, longitudinally plaited; in *Vorticialis,* they assume the form of the letter V, in which the two arms are applied in approaching the preceding portions, and which are bordered by lobes or crenulations; in *Cristellaria,* the limbs cross, and are bound together by fleshy tubes, in number varying from one to four, and increase successively by five limbs. On the other hand, the genera *Rotalia, Melonia,* and *Troncatulina,* &c., leave after the action of the acid, a transparent membrane which envelopes the limbs, not allowing them to be separated; and the latter two have this membrane furnished with projecting tubes, in the interval of which the crust *(encroutiens)* of the shell is deposited, thus proving in these cases that the animal matter is united in globular masses in the interior, as in the green matter of *Zygnema.*

From these facts it results, that these bodies can neither be related to the Mollusca, nor to any other class actually established in the animal kingdom; and consequently M. Desjardins is led to propose the name of Symplectomeres, for their class, thus indicating that they are formed of *portions folded* together.—*Bulletin. de la Soc. des Sciences. Nat. du France, No. III.*

Extracts and Abstracts from Foreign Journals.

[From *Guerin's Revue Zoologique,* 1840.]

Laurent's considerations relating to Animal Ovology.—On the subject of the above communication relative to the four kinds of reproductive bodies of *Spongilla fluviatilis,* M. Laurent, at the sitting of the Philo-

matic Society of Paris, June 16, 1840, added his views relating to Animal Ovology.

He affirms that, when studying these bodies under both the simple and compound microscopes of different powers, with all the necessary precautions, and by means of a new compressor (compresseur), presented to the Academy of Sciences previously, he has been able to prove that, the general theory of Wagner does not apply to the several kinds of reproductive bodies of *Spongilla*. On this subject he detailed the results of his observations on the eggs and gemmæ of *Hydra vulgaris grisea*, which equally invalidated the Ovological theory of Wagler, and he concluded that, to proceed with more latitude in the investigation of the Ovology of animals, it would be better to adhere to the general formula of Harvey, which may be traced back to the time of Aristotle, for the reason that this formula expresses more clearly the whole of the facts known, without neglecting even one. It runs thus :—*Omne vivum ex ovo. Diversa primordia diversarum viventium ;.....conveniunt in uno ; primordium vegetale.* This *primordium vegetale*, is, says he, a kind of *cambium animale* already designated by German Zootomists by the name of *Blastema;* by M. Dujardin, under that of *Sarcode*. M. Laurent having observed and described it in the embryos of Mollusca, and other lower organisms, proposed to characterise it by the name of *Tissu blasteme*, in order to distinguish it from cellular tissue, and all the other living tissues in the organism of animals.—P. 190.

Valenciennes on the Electrical Organ of Silurus electricus.—At the Academy of Sciences of Paris, August 17, 1840, the author read a memoir, being New Observations on the Electrical Organ of *Silurus electricus (Malapterurus electricus)*. The author related that M. Geoffroy St. Hilaire, had described this organ as a mass of thick and compact cellular tissue, separated by a strong tunic. Rudolphi has observed a second tunic. M. Valenciennes stated, that he had seen not only one, but *two* similar tunics between them.—P. 253.

On the contractility of the Blood-Vessels.— Dr. Heule, of Berlin, endeavours to prove that all congestion of blood in the capillary vessels, and inflammations, are due to a species of paralysis of the coats of the capillary vessels. To prove this fact, he first endeavours to demonstrate that these vessels are possessed of a certain degree of contractility in their normal state, and that they are under the influence of the nervous system, as well as all other parts which contain muscular fibres. He then shows that they possess the same structure as the blood-vessels of greater calibre, and that these last, as well as the solid or hollow muscles, whether of organic or animal life, are composed of the same elements. This analogy of function and of structure, he appears to have proved from the microscopical examination of the muscles, the muscular tissue of the heart, the middle coat of the arteries, the walls of the capillary vessels, the subcutaneous cellular tissue, and the dartos. The functional differences of these structures, he says, consist in this—that the movements of the solid muscles are subject to the will, and may be determined by mechanical and galvanic irritants, but not by the

action of cold; whilst the hollow muscles of organic life are excitable by the same agents as the muscles of animal life, but are incapable of being acted on by the will.

The middle coat of arteries, which has the same structure as the muscles of organic life, cannot be excited by the will; but may by mechanical irritants and by cold, but not by galvanism. If then, says he, the circulation is carried on in the larger vessels with the aid of contractility, which is a function under the influence of the nervous system, the capillaries must act in the same way, as their structure is identical. When the contractility of the capillaries is diminished by paralysis or want of nervous energy, the circulation is badly maintained, and congestions and inflammations are the result.

Dr. Heule states his ideas of the proper division of inflammations and congestions of blood; but they are not to be supported by facts.—*Wosenschrift fur die Gesammte Heilkunde, Oct.* 1840. *Translated in Edin. Med. and Surg. Journal, April* 1841.

[*From the Annales des Sciences Naturelles, for March* 1841.]

Researches on the changes in the proportions of some of the principles of the Blood (fibrin, globules, solid contents of serum, water), in various diseases.—By Andral and Gavarret. The details of this interesting communication are of greater interest to the physiologist than to the microscopist. The paper was commenced in the xiv. vol. (1840) p. 361.

Observations on the growth and changes of the Genera Campanularia and Syncoryna.—By M. S. L. Lowen. The conclusions arrived at by M. Lowen, first with respect to the larva of the genus *Campanularia,* (and indeed the whole family of the Sertularidæ, are, that the Campanularia are free, and not attached during the early period of life, swimming here and there. They are, in this larva state, altogether different in form to that which characterizes them in their perfect state. In the latter, the Campanularia is fixed, and enclosed in a covering (or bark) of a horny nature. This once produced, is but an inanimate excretion, from every part of which the living portion which made it becomes detached, and does not further nourish it. It is within this protecting envelope that the Polyp is developed; that it takes the number, form, and dimensions of all its parts; it then breaks mechanically through its capsule, and is arrested in its growth.

If the whole of these phenomena are collectively considered, the term metamorphoses cannot be said to be inaptly applied; the comparison of the first state to that of a *larva,* and the second to that of the *chrysalis;* to see the male Polyp developed within its cellule, the *image* surrounded by its chrysalis-like covering, which even protects it after it has opened. The female polyp, on the contrary, disengages itself complete from its larva, accomplishes the end which is designed, that of assisting propagation, and dies. The species on which the observations were made, was *Campanularia geniculata.*

With regard to the genus *Syncoryna* of Ehrenberg, two species are found on the coast of Norway, *S. ramosa,* Ehr., and *S. Sarsii,* Lowen,

with which the author made his observations, and arrived at the following conclusions:—As soon as the female Polyp has acquired a certain degree of development, instead of having five tentacles, it raises in its interior, projections, which are small capsules, fixed by a pedicel and filled with a mucous substance. These become transformed into eggs or gemmæ. As soon as they are mature, the capsules are detached and move freely; at length the eggs are expelled from them, and become fixed on the earth, or on some other submerged body.

If we compare the genus *Syncoryna* with that of *Campanularia*, we shall find the following affinities and differences:—Both have an external capsule in the form of a sac, with transparent walls, the border of which bears the cirrhi or tentacles, and in the interior of which, vessels convey the nourishing fluid towards the stomach. This last organ is formed by a kind of budding or enlargement of the intestinal canal. The eggs appear around the alimentary cavity; but the difference in form of this external capsule, the different number of tentacles, the presence of eggs, at least in the *Syncoryna Sarsii;* the vivacity of the movements of this last genus; the almost perfect immobility of Campanularia; the probable circumstance, that Syncoryna becomes free at a period of its existence; the atrophy, on the contrary, of the female Polyp of Campanularia, testify the great points of difference which exist between these two genera.

The following are the characters given by M. Lowen, to his new species of Syncoryna:—

Sync. Sarsii.—Semipollicaris, capillacea, tubulis $\frac{1}{10}'''$ — $\frac{1}{12}'''$, crassis, lævibus; gemmis elongatis, arrectis; parce ramosa. Masc. tentac. 10—16; Fem. globosis, cirris elongatis; oculis exquisitè rubris; campanula membrana perforata, clausa.

Hab. In fissuris rupium, etiam in aquâ stagnante, ad insulam Masskoïr, &c., Bahasiæ.

The above paper is illustrated by a beautiful plate, in which the anatomical details are clearly defined, and the new species figured.

[*From Poggendorf's Annalen*, 1840.]

Ehrenberg on the Mineral called Dysodil, as a product from the Shells of Infusoria.—In 1808, M. Cordier, in Paris, gave this substance the name of *Dysodil*, as a peculiar species of mineral; it had, however, previously been placed by mineralogists amongst the bituminous substances, and called *foliated mineral pitch* (blättriges, *Erdpech*). As is well known, it is combustible, and in Sicily, where it was first discovered, it is used as peat.

As early as the 16th of April 1840, I made a communication to the Society of the Friends of Natural History in Berlin, (see the Staatszeitung of the 29th of April), in which I stated, that this mineral occurring in Sicily, resembling yellow wax, and composed of densely matted together silicious shells (Kieselschalen) of the *Naviculæ*, penetrated and cemented by a kind of resin, consists of a species of mail-

covered Infusoria. I also stated, that there existed in the collections of the mineral dealer, M. Krantz of Berlin, a lignite from Westerwalde, the colour of which is quite black, and in which may be recognized all the microscopic characters of the yellow Dysodil of Sicily, but which is distinguished by its containing a considerable quantity of pine-tree pollen, and other vegetable remains. Since that time it has been found in two other places. The foliated serviceable bituminous coal from Geistinger Busch, near Rott and Siegburg, to the north of the Siebengebirge, is, although as black as old leather, quite similar to the Dysodil, only it is richer in vegetable remains.

In a fourth similar foliated lignite from Vogelsberge, given me to examine, as were the former, by Ober-Bergrath von Dechen, there may be recognized very beautifully preserved Infusorial shells. This substance is also like the black dry sole of a shoe. From these inquiries we see, that the species of mineral called Dysodil, belongs to the Infusorial conglomerates, and it is evidently a *Polirschiefer* or *Blättertripel*, accidentally *penetrated by mineral pitch;* whilst at Bilin, Cassel, &c., it appears without any admixture of bitumen. Its colour may be yellow, or even brown and black. It nowhere forms exceedingly large, but rather extensive and useful beds. — *Ann. Nat. Hist. Vol. V, p.* 150.

Turpin on Crystals of Carbonate of Lime in the eggs of Cryptella Canariensis.—Numerous crystals of carbonate of lime form the inner portion of the external covering of the egg of Cryptella. To observe them well, it is necessary to cut slightly the external covering, so as to obtain the internal envelope entire, with its albumen and vitellus. Portions of the external covering, viewed under the microscope with a power of 200 times, show that it is transparent, yellowish, and furnished with a net-work of very fine fibres, somewhat regular, and between the coats of which exist a great number of very small globules, varying much in figure and size.

The internal surface of this covering is, as it were, studded with a layer composed of an infinite number of crystals of carbonate of lime. These crystals vary in size, are semi-transparent, greyish, and appear like fine sand spread uniformly over it. They also vary in their forms and angles, and instead of presenting a transparent appearance, the angles and facets were those of the fine rhomboids, which I have discovered in the eggs of *Helix aspersa,** *H. hortensis, H. ericetorum, H. pomatia.* Their forms, and particularly their indistinct angles, are very much analogous to those met with in the interstitial tissues of all parts of the body of *Paludina vivipara.* These crystals, measured by a micrometer, varied from $\frac{1}{200}$ to $\frac{1}{75}$ of a millimètre.

It is very remarkable, that the particles of carbonate of lime, which gives the substance to the shells of the eggs of birds and reptiles, but in them are deposited in confusion, molecule by molecule, crystallize in the *rhomboidal* form in the egg of *Cryptella* and *Helices,* at least in the

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* Annales des Sciences Naturelles, Vol. XXV, pl. 15.

four species above quoted. — *Webb et Berthollet's Synop. Mollusc. des Iles Canaries.*

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

July 21*st*, 1841.—*J. S. Bowerbank, Esq., F.G.S., &c., in the Chair.*

Mr. W. Banks Hudson was elected a member. — A paper was read from the Rev. J. B. Reade, M.A., F.R.S., "On the process of Charring vegetable tissue, as applied to the examination of the Stomata in the Epidermis of Garden Rhubarb."—The object of the author was to give the details of the results of a recent application of this process to epidermis of the leaf-sheath (*Ochrea*) of the common garden rhubarb, which was obtained by macerating it in water for a few days, and removing it carefully by means of the fingers. He alluded to the opinions of Brown, Lindley, Decandolle, Brogniart, Link, and others, connected with the matter in question; and Mr. R. considers, that those who deny the existence of apertures *in toto* in the stomata are unquestionably wrong. After describing many points in detail, the following facts were considered as established :—That, in the simple uncharred state of the semi-transparent tissue, there is much room for difference of opinion, so that the eye, fortified by a little previous theory, might most probably see the *stomata* either open or closed; that the application of the process of charring proves, beyond a doubt, that the *stomata* in this tissue of the rhubarb are *distinct openings* into the hollow chambers of the parenchyma of the leaf; that the perforation is the rule, and not the exception, in the structure; and that the exception, where it exists, *i. e.*, where the *stomata* are closed, proves the existence of the overlying membrane discovered and described by Mr. Robert Brown. This last fact, Mr. Reade considers to be very satisfactorily established. The membrane alluded to, although in some cases wholly absent, yet in others it slightly projects, beyond and along the margin of the aperture; it is sometimes partially extended quite across, and again, as a delicate *tympanum*, it wholly overlies the *stomata*.

Mr. E. J. Quekett exhibited some fossil Infusoria received from Prof. Bailey, West Point, New York, lately discovered by Prof. W. B. Rogers of the University of Virginia, underlying the city of Richmond. The stratum of that point being about twenty feet in thickness, and no doubt extending some considerable distance, as the same formation is observed on the banks of the Rappahanoch river. The fossil Infusoria hitherto received from the United States, have been all of recent formation, from fresh-water deposits; but the specimens exhibited are all marine, belonging to a much earlier formation; and, according to Prof. Bailey, occupying a position in the tertiary strata between the *Eocene* and *Miòcene* periods.

The silicious skeletons of Infusoria observed are several : The most common being a *Gallionella*, not at all like any figured by Ehrenberg, probably a new species; *Actinocyclas* of six rays (*Senarius*, Ehr.), others of ten rays, and some of four only. Amongst other remains are some

discs of beautiful structure, appearing as if ornamented as the engine-turned case of a watch; and some other bodies, having the appearance of a cellular nucleus, from which radiate four spines of unequal lengths. Besides these were several other forms, never before observed in the fossil Infusoria of other countries.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

July 1*st*, 1841.—*Mr. Yeates in the Chair.*

The Secretary having read the Minutes of the last meeting,

Mr. Bergin read a letter from Captain Portlock, enclosing a portion of Infusorial earth from the county of Down, at the base of the Mourne mountains. It was taken from the bank of a river under the bog.

A small portion of this earth having been examined under the microscope, was found to contain principally *Naviculæ*, *Bacillariæ*, *Eunotiæ*, with fragments of *Achnanthes*, and *Confervæ*. Mr. Ball proposed to separate the species, or rather sizes, contained in Infusorial earths, by washing in glasses, in the manner employed for preparing emery of different degrees of fineness.

Mr. Yeates presented to the Society a modification of the compressor, answering as a fine adjustment and universal object holder. He was requested to furnish the Secretary with a detailed description of the instrument, which he promised to do.

Microscopical Memoranda.

Ehrenberg's further remarks on the Animals of the Chalk.—M. Ehrenberg has communicated the result of his continued researches on the living animals of the Chalk, to the Academy of Berlin. He stated, that he had received from Berzelius some fresh mud from the sea-coasts of Sweden, which the Archbishop of Gottenbürg had collected in the Island of Tjoern, in the Cattegat. The most important, in a scientific point of view, were twelve living species, which had only hitherto been met with in a fossil silicious state, in the chalk marls of Caltanisetta in Sicily, and at Oran in Africa. Amongst them occurs, in a living state, the *Grammatophora* (hitherto *Navicula*) *Africana*, which has only been met with in a fossil state in the marls of Oran; the recent *Oceanica* also has only been met with in the marls of Greece. There is also to be met with in the waters of the Cattegat, a prismatic infusorial form, which Ehrenberg has observed in the marls of the Oran, which would belong to the genus Staurastrum, if it could be placed in the subdivision of Infusoria, characterised by a soft vertex (*carapace*), and which is distinguished by having four apertures at the four angles. He proposes to class it under a new genus, by the title of *Amphitetras antediluviana*. Among the living forms of the Northern Seas, he has also found one similar to the *Dictyocha Speculum*, but spiny, like the *D. aculcata* of Sicily. Lastly, he has discovered a series of eight species of the genus Actinocyclas, of the radiated subdivision, destitute of a septum, which form the great mass of silica in the chalk marls of Cal-

tanisetta, and especially of the Oran marls, and which are characterized by the number of their rays. The species possessing 6, 7, 8, &c. rays, are particularly observable, and which are known by the terms *A. biternarius*, *A. septenarius*, &c. In addition to these discoveries, Ehrenberg, since this communication, has found in the water of Cuxhaven, in the living state, three silicious Polythalamia of the white chalk, and two silicious Infusoria of the chalk marl. These are *Rotalia globulosa*, *R. perforata*, *Textilaria globosa*, *Gallionella sulcata*, and *Navicula didymus*. To these seventeen forms, occurring in a living state, and also fossilized in the chalk formations, Ehrenberg adds two silicious Infusoria, which have since been detected in the chalk marl, viz., *Striatella arcuata* and *Tessilla catena*. These nineteen forms now noticed, combined with these announced in October 1839, and June 1840, make twenty-one genera and forty species of Polythalamia and Infusoria, which are now found alive, and also occur in a fossil state in the chalk formations.—*Athenæum, July* 24, 1841.

Ehrenberg's New Method of observing the Animalcular Composition of Chalk.—Place a drop of water upon a lamina of mica, and put into it of scraped chalk as much as will cover the fine point of a knife, spreading it out, and leaving it to rest a few seconds; then withdraw the finest particles, which are suspended in the water, together with most of the water, and let the remainder become perfectly dry. Cover this remainder, so spread out, with *Canadian balsam*, the turpentine of the *Pinus (Abies) balsamea*, and hold it over a lamp until it becomes slightly fluid, without froth. A preparation thus made seldom fails, and when magnified 300 times in diameter, we see that the mass of the chalk is chiefly composed of minute well-preserved organisms. In this preparation all the cells of the Polythalamia appear at first black, with a white central spot, which is caused by the air contained in the cells, which, as is well known, appear under water as annular black bodies; but by degrees the balsam penetrates into all the single cells, the black rings of the air vesicles disappear, and we recognize all the small cells of the Polythalamian animals, often presenting a very pretty appearance.—*Note to Mr. Weaver's View of Ehrenberg's Observations on the Organic Composition of Chalk, in Ann. Nat. Hist., June*, 1841, *p.* 309.

Ross's Educational Microscope.—Mr. Ross has at length completed, for educational purposes, a compound microscope of strength, durability, and steadiness, and of a very simple construction, which contains all that is requisite to use with perfect success magnifying powers to 350 times linear. It is made the basis of the most complete compound microscopic, so that the various mechanical conveniences and appendages which constitute the most perfect instrument, may be applied at the convenience of the purchaser. The optical part consists of three combinations, which, in conjunction with two eye-pieces, give magnifying powers of 30, 60, 80, 120, and 250 times, and with an additional eye-piece 350 times, with definition capable of resolving the usual test-objects, such as the markings on the scales of Menelaus, clothes moth, and Brassica, and exhibiting the stronger order of markings on the scales of the Podura. We inspected this instrument at the last meeting

of the Microscopical Society of London, and can safely recommend it to the attention of the scientific public. The price of this instrument is only £12.—*Editor.*

Gulliver on the Muscular Fibres of the Œsophagus and Heart in some of the Mammalia.—The author, after alluding to the difference of opinion that exists as to the extent to which the muscular fibre of animal life invests the gullet, a discrepancy which has probably arisen from the want of a sufficient number of comparative observations on the lower animals, and states, that it has been generally concluded, that this fibre is confined to the upper portion of the tube, Prof. Müller, Dr. Schwann, and Mr. Skey informing us, that the striated muscular fasciculi are either confined to this part of it, or belong only to the muscles of the pharynx; while M. M. Ficinus and Valentin have been led to assign a much more extensive range to the fibre in question. He then proceeded to give the details of his investigation in this subject, from which he concludes, that the muscular fibre of animal life extended much further towards the stomach in certain brutes than in man, but that there was also a remarkable difference in this respect even among genera of animals.—*Proc. Zool. Soc. Sept.* 10, 1839.

Ehrenberg on Neurine.—Professor Ehrenberg has shown, that neurine actually consists of very minute fibres; and he informs us that these fibres can only be discovered by the aid of a magnifying power of 300 diameters, and that he was sometimes obliged to have recourse to a much greater magnifying power, as 800 diameters, in order to bring them into view. He examined thin slices of the recent brain, and states, that the fibrous structure was in general most obvious at the margins of the slices. These fibres, in the cineritious portion, are interspersed with globules and plates; the greater number of these fibres, instead of having a regular cylindrical form, are knotted like a string of beads, the swelled portions being situated at some distance from one another, and united by narrower parts, which are continuous with them, and are formed apparently of the same material. Besides these fibres, which Ehrenberg calls *articulated*, he observed, towards the base of the brain and crura cerebri, other somewhat larger fibres, of a regular cylindrical form, interspersed upon the knotted ones. The cylindrical fibres are about $\frac{1}{120}$th of a line in diameter.

The cortical substance seems, according to Ehrenberg's observations, to differ from the medullary or white, chiefly in the want of the straight cylindrical fibres, and the articulated fibres contained in a dense network of blood-vessels, and being covered by a layer of free granules, larger than the dilated parts of the knotted fibres.

The cylindrical fibres are tubular, containing a granular medullary matter; the articulated ones do not appear to be so.

The optic, olfactory, and auditory nerves, are composed of the articulated fibres, while those of motion are clearly cylindrical, but seem to be continuous with the articulated fibres of the brain and chord; the structure of the nerves of ordinary sensation is not so clearly ascertained.—*Samuel Solly On the Brain, p.* 7.

XXV.—ON THE SILICIOUS BODIES OF THE CHALK, GREENSANDS, AND OOLITES.

By J. S. Bowerbank, Esq., F.G.S.

[Continued from page 103.]

The perpendicular and oblique veins of flint, found in the chalk cliffs between Brighton and Rottingdean, and described by Dr. Mantell, present precisely the same internal characters as the tabular flint and the common tuberous nodules. The external characters are also similar to those of the tabular flint. If we observe these veins *in situ*, we shall frequently perceive, that the whole of their substance is not of uniform density, but that there are often, near the middle of the vein, parts where the two interior surfaces have not united, and that the spaces are generally filled with chalk. If this chalk be carefully removed or dissolved by diluted muriatic acid, the internal surfaces present the same appearances which have been described as characterizing the exterior of the ordinary flint nodule; and the aspect of the whole is precisely such as we should expect to find, if the two sides of a fissure in a rock were covered by our common fresh-water sponge, or one of similar habits; and the two outer surfaces had been built towards each other, and had joined in some parts, while in others they had approached, but had not united. The sides of these flint veins are not studded with numerous species of *Foraminiferæ*, like the under surface of the tabular flint, but from the position in which the flint veins have been built, it is a natural consequence that this should not be the case.

Having thus satisfied myself that the common tuberous flints, the horizontal tabular flints, and those forming perpendicular or oblique veins, were all produced by the same agency; and having observed the frequent occurrence of the partial imbedment of shells and other extraneous bodies, I was naturally led to infer, that in all probability the interior casts of *Echinites* and similar bodies, which are frequently found to be filled with flint, were also produced by the same agency; I therefore procured numerous specimens of silicified Echinodermata, and their examination strongly corroborated this supposition. Some of them were not entirely filled with flint; in one case a small portion only was silicious, in others two-thirds or three-fourths of their interior were so occupied, while the remaining space was filled with chalk. Upon clearing away the chalk from this part of the specimen, the flint never

presented an even surface, such as would have been produced had a portion of fluid matter entered though the ambulacra and subsided, as water or any similar liquid would have done; but, on the contrary, the surface was always undulated, and frequently projected considerably above the surrounding parts, more especially near the side of the shell, against which it was frequently built in semi-cones or columns, and in the space thus unoccupied by the flint there was always included one or both of the large orifices of the shell. The undulated surface of the flint thus concealed within the Echinite, presents exactly the same organic characters which are observed on the flint nodules. Most frequently the Echinite is filled with the flint; and the animal having thus built its prison full, has usually perished from want of sustenance; at other times it has survived this incarceration, and has grown out of one or both of the great orifices of the shell, and has then, in some cases, increased to a very considerable extent. On the exposed surface of the whole of these, whether it be only to the extent of a slight convex projection from the orifice of the Echinite, or to a considerable mass, an accordance will be found with the organic characters before described.

If some of the specimens of *Galerites* and *Spatangus*, which are filled with flint, be placed in diluted muriatic acid, and the whole of the shell be removed, the appearance presented by the silicious casts will still further corroborate the opinion of their spongeous origin. Occasionally it will be found, that the ambulacral orifices of the shell have been filled with fine threads of silex, and that these are based upon the cast; but more frequently we shall find, that opposite to each of these numerous minute orifices, there is a small but deep depression, the interior of which presents the usual characteristic surface observed on all flints, and the minute tubuli will be seen as boldly projecting at the bottom and round these small excavations, as upon any of the exposed surfaces of the flint. In these cases the ambulacral orifices of the shell have evidently been used by the sponge as so many inlets to admit the streams of water which were necessary to its existence; and the depressions thus produced directly beneath them, were clearly intended as a means of facilitating this operation. On the surface of the cast, in the immediate neighbourhood of the two large orifices of the shell, there is frequently a series of channels, which have evidently been left by the sponge for the same purpose as the depressions opposite the ambulacral pores, and the bottoms and sides of these channels exhibit the sponge tubuli in a like manner.

It frequently occurs in the *Echinites* which are filled with flint, that portions of the shell have been replaced or infiltrated with silex. In all these cases that I have seen, the silex presents a stalactitical or chalcedonic form, and never exhibits the spongeous texture. Very frequently, however, thin laminæ of spongeous texture are found to have been built between the plates of the Echinite, where they have happened not to have been quite in contact; and in these laminæ the tubuli are as beautifully distinct as in the most favourable portions of the mass of the cast. If the surface of the cast be microscopically examined, we shall frequently observe that the flint has not been in such a state of contact with the shell as a cast from a fluid material would be supposed to present; for although the boundary of each plate is well marked, the areas of their impressions exhibit such a view of the tubuli of the sponge as we might naturally expect to find where numerous minute tubes have been built against a flat or slightly concave surface. Sometimes the sponge has grown round the interior of the shell, and has left a hollow near its centre; and occasionally the sponge appears closely approximating, yet not quite adhering, to the inner surface of the Echinite. In these cases, a thin film of chalcedony is frequently spread over the organized surface of the sponge, which, in a specimen in my possession, is in several places to be seen through small breaks in the film.

(To be continued.)

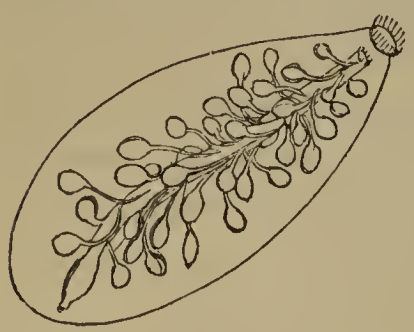
XXVI.—AN ABSTRACT OF THE "INFUSIONSTHIERCHEN" OF EHRENBERG.—No. 2.

By W. Hughes Willshire, M.D., M.B.S., Physician to the Fore Street Dispensary, &c.

THE Infusoria are divided by Ehrenberg into two great classes, *Polygastrica* and *Rotatoria*. The *Polygastrica* are characterised by having their intestinal canal provided with numerous digestive sacs, or stomachs, and by their non-possession of a true rotatory apparatus. The *Rotatoria* are distinguished by their intestinal canal being simple, and by their possession of peculiar ciliated organs, by means of which they perform certain rotatory movements. The following are the characters of the Class *Polygastrica*, to which is added a Synoptical Table of the Families.

Class I.—POLYGASTRICA.

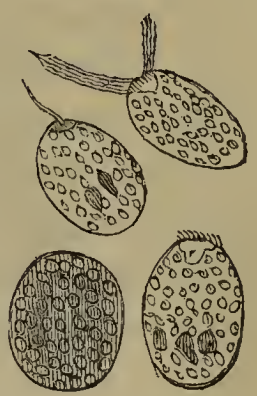
Invertebral animals having no pulsating vessels; the intestinal canal provided with numerous globular digestive sacs, or stomachs; motion performed by pediform processes (very often vibrating), no true articulated feet being present; hermaphroditic. Form of body indefinite, from its property of increasing by gemmæ and spontaneous self-division.



- **Intestinal Canal not definable, nor distinct from the digestive sacs, or stomachs.—*Anentera.***
  - Body devoid of appendages (no pediform processes) *Gymnica.*
    - Form of body constant
      - Self-division perfect or complete
        - Illoricated — MONADINA.
        - Loricated — CRYPTOMONADINA.
      - Self-division imperfect or incomplete (hence clustering)
        - ..... VOLVOCINA.
        - ..... VIBRIONIA.
        - ..... CLOSTERINA.
    - Form of body varying.
      - Illoricated .... ASTASIÆA.
      - Loricated .... DINOBRYINA.
  - Pediform Processes, varying. *Pseudopoda.*
    - Illoricated .... AMŒBÆA.
    - Loricated
      - A compound pediform process from one aperture — ARCELLINA.
      - A simple pediform process from one or each aperture — BACILLARIA.
  - Hairy. *Epitricha.*
    - Illoricated ..... CYCLIDINA.
    - Loricated ..... PERIDINÆA.
- **Intestinal canal distinct and definable. *Enterodela.***
  - Having but one orifice both for the reception and discharge of nutritious matter.—*Anopisthia.*
    - Illoricated ... VORTICELLIA.
    - Loricated ... OPHRYDNINA.
  - Having an anal and an oral orifice, one at each extremity.—*Enantiotreta.*
    - Illoricated ..... ENCHELIA.
    - Loricated ..... COLEPINA.
  - Orifices not terminal (oblique or varying) *Allotreta.*
    - Illoricated
      - Mouth furnished with a proboscis; tail not present — TRACHELINA.
      - Mouth anterior, tail present ... OPHRYOCERCINA.
    - Loricated ..... ASPIDISCINA.
  - Orifices ventral. *Catotreta.*
    - Illoricated
      - Locomotive organs—Cilii ..... COLPODEA.
      - Locomotive organs—various..... OXYTRICHINA.
    - Loricated ..... EUPLOTA.

Family I.—Monadina.

Polygastric animalcules having no distinct intestinal canal, lorica, or appendages; body uniform and constant in shape, dividing by spontaneous self-division not only into two portions, but by cross division into four or more.



All self-moving little bodies discoverable in water by the aid of the microscope, destitute of feet, hairs, bristles, or other external appendages; possessing no special gelatinous, membranous, or hard covering, like a lorica, but provided with internal digestive sacs, or stomachs, without a distinct intestinal canal uniting them together; not clustering in a chain, but sometimes appearing as if double, from the constriction of self-division, or from decussating constrictions, as if composed of four portions, or even-looking, like a mulberry; and whose globose, oval, or elongated bodies, during rest or motion, show no voluntary change of form: belong to the family Monadina. The following is a Synoptical Table of the *Genera*.

- Tail not present.
  - Lip not present
    - Swimming
      - Eye not present
        - Solitary ..... Monas.
        - Aggregated
          - voluntarily ..... Uvella.
          - through self-division Polytoma.
      - Eye present
        - Solitary
          - Proboscis one or two Microglena.
          - Probiscides many..... Phacelomonas.
        - Aggregated..... Glenomorum.
    - Rolling..... Doxococcus.
  - Lip present ..... Chilomonas.
- Tail present ..... Bodo.

XXVII.—On the structure and uses of the Stomata.*

By Thomas Williams, M.B., M.R.C.S., Lecturer on Forensic Medicine, &c.

The ultimate organization and functions of the Stomata of Plants have long formed the subject of hypothesis and dispute among high authorities in vegetable physiology.

The best informed of the earlier observers regarded them as follicular pouches of the epidermis, through which the aqueous portions of the elaborated sap were exhaled. In his more recent work, it is stated by De Candolle, that they constitute the spaces where the spiral vessels end, and through which the latter obtain their supply of air; and hence has probably originated the title of "breathing holes," under which they are popularly known. By many modern botanists, they are described as definitely organized openings leading into cavities which freely communicate with the spaces between the cells of the parenchyma. There are not wanting others, by whom the *patulous* state of the stomata has been denied, who consider them to be closed by a membrane, described as a continuation of the epidermis, and which from its delicacy and transparency is invisible under ordinary circumstances. The mode adopted by the Rev. Mr. Reade to render evident this pellicle under the microscope, consists in charring the leaf to be examined, between two pieces of glass. Anxious to determine practically the relative merits of these conflicting observations, I submitted the leaves and green parts of several plants to this charring process; and unquestionably succeeded in rendering appreciable, in many instances, the existence of a pellicle over the stomata. But in order to be certain that this membrane was not the result of heat employed in preparing the leaf, of which I had some suspicion, I contrived a modification of the process suggested by the Rev. Mr. Reade. After having determined, by repeated observation, that *some* of the stomata in the spatha of the garden rhubarb *appeared open*, it was immersed in warm water, after which air was gradually forced into the parenchymatous interspaces, under the receiver of an air-pump,—the success of the injection being indicated by the extrication of minute bubbles of air from the inferior surface of the leaf. The escape of the air was evidently made through the stomatal orifices

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* Read at the Microscopical Society of London, August 18, 1841, and communicated to that Society by the Editor.

—this, at least, is the probable inference—and if admitted, a proof is afforded of the *open* condition of the stomata. The *injected* leaf was then carbonized between plates of glass, and again examined with reference to the condition of the stomata. Surprise was excited when, notwithstanding the proof of the patency, as presented by the escape of the infused air, a pellicle over the stomata, darkened by the charring as in the uninjected leaf, was observed under the microscope. This similarity of result, obtained by processes of experiment essentially different, establishes the correctness of my former suspicion, that the membrane is generated in the preparation of the leaf. Nor is this circumstance difficult of explanation, since in all plants a gummy substance, called by the Germans *Phycomater* or organic mucus, covers the surface and even the cells of the stomata and parenchyma; constituting, according to the more recent observations of Schwann, the materials out of which cells are originally formed. In reference to the stomatal pellicle, therefore, in the lamina of a fully developed leaf, the explanation is most probable which supposes that the air which, always in minute quantities, occupies the intercellular spaces, dilating under the heat of charring, acquires force enough to carry before it a bubble of this mucous substance, the summit of which becomes carbonised when brought into contact with the heated glass. By adhering to the margins of the aperture, it thus presents the appearance of continuity with the surrounding epidermis. In the examination of stomata generally, however, it should be remembered, that in some species of plants this mucous covering assumes the form of a universal cuticle, and by its induration over the stomata forms a distinct unorganised membrane.

After having multiplied to a few additional instances the observations, of which the results are just stated, it became evident that the stomatal organs, even in a limited portion of cuticle, exhibited different characters. By carefully detaching the epidermis from the stem of the *Tradescantia*, the stomata could be distinguished in a perforate condition, without any variation either in the figure or diameter of the orifices. In making, however, a comparative examination of portions of cuticle stripped from the inferior surface of a maturely formed leaf at the base, and from a small expanding bud at the summit of the stalk, differences in the form of the stomatal organs were again recognised. It was not until my examinations had been extended to several other plants, that I associated these varieties with differences in the *age* of the leaf from which the cuticle was taken for inspection. On the young and old leaves of the *Anchusa angustifolia*, and still more strikingly (if the

cuticle, which is dense, be shaved off with a sharp, thin scalpel) on the buds and expanded leaves of the *Ficus elastica*, when contrastively examined, the following distinctive features can be readily determined. Previously charred, the cuticle from the younger leaves will present stomata, which consist of two or more elliptically disposed vesicles, enclosing apparently a membrane, darkened by the charring, which can be distinctly observed to be bisected by a diaphanous line longitudinally traversing the oval space of the stoma. These appearances can likewise be distinguished in the *un*charred cuticle, with the difference, however, that the membrane here appears more like flattened cells, studded in their interior with granules of chlorophylle, which impart to the oval *space* a shaded or dark character; and this latter circumstance explains away the error of the idea which some microscopists have entertained, that the dark appearance is caused by the presence of air in the cavity beneath. In the epidermis of the older leaves, on the contrary, charred or uncharred, unequivocal perforations can be discovered bounded by *transparent* vesicles. Between these two extremes of the fœtal and adult formations, numerous intermediate conditions are presented. The *transparent* line, which I have satisfied myself to be a fissural aperture between the two apposed, darkened vesicles, with advancing development, acquires greater breadth, until ultimately it assumes the character of an *oval orifice*. By comparing the stomates on the bases and apices of the leaves of the *Hyacinthus orientalis*, the distinctions here indicated may be conclusively determined. Subsequently to the settlements of these points, my attention was directed to the observations of M. Hugo Mohl* on the development of these organs, in which allusion is made to the views of M. Mirbel.† While no positive statement is made in regard to the persistent condition of the stomata, it may be obviously seen that the account which is here presented, derives confirmation from their labours. These observers conducted their examinations upon the leaves of the *Marchantia polymorpha*, stalks of *Gourds*, and on the cuticle covering the articulations of *Tygnema*. Although their opinions are somewhat different, they agree upon the principle, that the orifices of these organs result from the graduated separation of the vesicles, which are nothing more than ordinary epidermoid cells, modified into a specific form. These facts, then, obviously point to the *general inference*, that the *normal* condition of the stomata is that of complete perforation, and that when the ap-

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* Annales des Sciences Naturelles, 1840, p. 222.

† Comptes Rendus, Tom. iii., p. 568.

pearance of an overlying membrane, *without* a central chink, is remarked, its adventitious formation may be inferred.

Whatever may be the difficulty of circumscribing into a definite function, the process of respiration in vegetables, physiologists can no longer doubt the tendency of facts in relation to the use of the stomata. It suggested itself to me, that if some expedient were contrived to suspend the functions of the stomata, a sort of negative or pathological evidence might be obtained in regard to their uses. The most effectual means, after some trials, were found in common varnish. If the *superior* surface of an aquatic leaf, to which it is known the stomata are confined, be well coated with varnish, after the lapse of a few days a distended, unhealthy, and ætiolated state will supervene. Under the conditions of this experiment, it is evident that two important consequences follow :—That, firstly, the process of exhalation is rendered impracticable by the impervious coating, inducing thus an undue retention of water in the Parenchymatous cells ; and that, secondly, since the decomponent agency of the light continues, the liberated oxygen is equally retained, and, if the diseased appearance of the leaf be admitted as criterion, proves deleterious to its organism. Time and opportunity have not allowed me to correct and multiply these observations. So far as my acquaintance with botanical literature extends, I am not aware that this mode of experimenting upon the stomata has been anticipated. From various physiological considerations, the accuracy of the analogy cannot be doubted, which makes the stoma to the pneumatic or respiratory system of the plant, what the spiracle is to the tracheal apparatus of the insect. Although the former description of M. De Candolle, that the spiral-vessels communicated by open mouths with the stomatal cavities, has been denied by high authorities in modern phytology, from the experiments of Dutrochet, Dumas* and Dr. Boucherie, it is obvious that the spiral-vessels derive their supply of *atmospheric air* by means of the stomata. In the leaf of the Holly, which, upon maceration, separates into two layers, I have satisfied myself that the spiral-vessels accompany only the excurrent woody fibres, and are therefore confined to the upper lamina of the leaf. A parallel to this arrangement is found in the structure of some insects, in which the tracheal tubes follow *only* the centrifugal currents of blood. In the Holly, therefore, the communication with the stomata at the inferior surface, can only be indirectly through the intercellular passages.

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* Comptes Rendus de l'Academie des Sciences, 1840.

Extracts and Abstracts from Foreign Journals.

[*From the Annales des Sciences Naturelles.*]

C. Montagne on the Nucleus of Sphærophoron.—The apothecium of this genus of Lichens is at first only an elliptical expansion of the extremity of a division of the plant. If, in this state, a longitudinal section be made, the cavity will be found to be occupied by the nucleus, which is of a diagonal form. This circumstance is owing to a hemispherical projection of the medullary or central layer of the thallus, representing a kind of torus, from all parts of which, tubes, bearing sporidia or thecæ, diverge. The upper part of the sporangium is already filled with this scobiform substance altogether different from the sporidia, the colour of which is of a beautiful blue or transparent indigo, but which appears very black when in a mass; the thecæ and sporidia are tinted of a like shade, but for the most part paler. By degrees the cavity enlarges, not only by the increase of the extremity of the branch, but still more by the insensible depression of the internal projection formed by the medullary layer of the thallus.

The nucleus contained in the apothecium differs but little from that of other Lichens. It is composed of straightened filaments, pressed one against the other, exactly as in the proligerous plate of a Lecidea, and united together by the intervention of a mucilaginous substance, a ready absorbent of water. These tubular filaments, closed at their free extremities, have absolutely the form of *asci* or utricules of a Peziza. They are linear, obtuse at the summit, and contracted into a short pedicel at their base, which appears to be the continuation of the filaments of the medullary layer. In their young state, they are perfectly transparent, and contain an opaline moisture (humeur) in which appear hereafter transparent globules. They are only to be seen by readjusting the focus of the microscope. In a short time these filaments, which can only be considered as true thecæ, take on a bluish tint, becoming more intense by age, preserve always the sky blue colour when viewed by transmitted light.

The sporidiæ become also more and more apparent in the thecæ: whether globular or oblong, they are arranged in a single row. At length, the theca is about to burst; they remain free, and mix with the mass of black dust, from which they are nevertheless distinct, and which is very difficult, at least for Dr. Montagne, to determine the origin, for it exists from the very first formation of the apothecium.

The theca is from five to six hundredths of a millimetre in length, by a two-hundredth in diameter. The sporidia, which are quite spherical, or rather longer than they are wide, acquire, when free, about the $\frac{1}{100}$th of a millimetre in diameter. The sporidia are surrounded by a transparent expansion (limbe) and are, like the thecæ, of a blue colour. —*March* 1841, *p.* 149.

Agassiz on the Structure of the Scales of Fish.—M. Mandl considers that I am mistaken in affirming, that *the scales are composed of super-*

posed plates; he asserts, on the contrary, that they are formed of *juxtaposed cellules.* He endeavours to show it in the scales of Locha; and yet, in the same fish, I have succeeded in separating the plates, as they grow one upon the other; and in numerous transverse sections of different scales, I have seen, with a power of 250 diameters, the superposition of these plates throughout the whole thickness of the scales; I have even published a figure of a similar section of the scale of *Salmo Trutta*, in my *Histoire Naturelle des poissons d'eau douce.*

Mandl further affirms, that the diverging traces on the surface of the scales, which I have described as *furrows*, are true *canals.* I can scarcely imagine that Mandl has mistaken the middle tubes of the scales of the lateral line (which ramify occasionally at their posterior extremity) with the furrows of their surface; this would be imputing to him too gross an error; nevertheless, I cannot see (entrevis) any other explanation to that which he advances; but that which I can positively affirm is, other scales never have canals in their surface, but furrows, compressed from above, which are prolonged to the margin of the superior layer of growth to the edge of the next inferior layer, as is evidently seen in all transverse sections that can be made in any scale offering similar traces.

Mandl is of opinion, that the toothings on the posterior border of pectinated scales are not *notches of the borders of the plates*, but *true teeth, having a root enveloped in a sac.* It is quite sufficient to examine the scales of Sciena, which Mandl cites as an example, in adjusting successively the scale by the focus of the microscope, to be convinced that all this apparent dental apparatus depends on optical illusions, resulting from the difference of thickness of these dentations at their base and at their point; and that in truth, the points which tooth the posterior border of the scales of fish, which I call *Ctenoidæ*, are simply the result of *notches*, more or less deep at the border, and not detached teeth.

Lastly, Mandl appears to be unacquainted with the existence of enamelled scales, which differ materially in their structure from those of ordinary fish, and are found in an order, of which the greater number of species are extinct, and to which I have given the name of Garoidæ. To these, and other remarks, M. Agassiz concludes, *from his new observations, that the description he has given on a former occasion is exact, and that the manner in which M. Mandl examined the same, is erroneous in every respect.*

To this Mandl replies in a succeeding Memoir, that:—1. The parts of the scales which I call *teeth*, are not, as M. Agassiz observes, the result of an optical illusion; I can show their existence to the Commission.—2. The *canals*, of which I have spoken assuming different forms, do not exist, according to M. Agassiz: the Commission may convince themselves that they really do exist.—3. I have nowhere stated the opinion attributed to me by M. Agassiz, that the scales are formed of *juxtaposed cellules;* I have, on the contrary, shown the presence of *two different lamellæ;* I speak, as may be seen in the analysis of my memoir inserted in the Comptes Rendus of the sitting of the 24th June, 1839, of *superposed lamellæ in an inferior fibrous layer*, and of *cellules*

only in the lines which are found on the surface of the superior layer of the scale. M. Agassiz has then fallen into a great error relative to the manner in which I examined the structure of the scales.—*January*, 1840, *p.* 58, 62.

[*From the Comptes Rendus.*]

Infusoria of Rock Salt.—M. Marcel de Serres communicated a note on the subject of the observations which he is making along with M. Joly. In the specimens of rock salt of a tolerably decided greenish colour, brought from Cardona (Spain), the Infusoria appear more rare, of a smaller size, and less distinct than in the specimens of a red colour before examined.

This, says M. Marcel de Serres, finds an explanation in M. Joly's previous observations on the change of tint, which the Infusoria that colour our salt marshes undergo by age. These animalcules, which are white at their birth, become green in their middle age, and do not till their adult age take the purple tint which makes them so remarkable. In general, the green Infusoria are not so often seen as the red in salt marshes, which seems to indicate that these *monades* remain but a short time in their middle state.

We have found the same Infusoria in the Argilo-calcareous marls, which are found at Cardona beneath the rock salt. In this locality they have their beautiful purple tint, but they are in too small numbers to communicate it to the mass of marl, which is of a greyish hue. This fact also proves, that in the ancient world, as in the present, the animalcules were precipitated after death to the bottom of the waters in which they had previously lived.—*March* 16, 1840.

Theory of Digestion, &c.—The Royal Academy of Sciences and Belles Lettres at Brussels, offers a prize for the best essay on this subject; embracing, more particularly, a microscopic examination of the chyme, and to determine the relation which subsists between the parts composing the chyme and certain aliments; such as albumen, gelatine, milk, and its products, &c.

The prize offered by the Academy, is a gold medal of the value of 600 francs. It is requisite that the memoir be legibly written in Latin, French, or Flemish, and that it be forwarded, free of expense, before the 1st of February 1842, to M. Quetelet, Perpetual Secretary to the Academy.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

August 18*th.*—*R. H. Solly, Esq., F.R.S. &c., in the Chair.*

A PAPER was read by Mr. John Quekett, 'On the Anatomy of four species of Entozoa of the genus Strongylus, from the *Delphinus Pho-*

cœna, or Common Porpoise.' The subjects of the present communication, with one exception, were found in the lungs of the porpoise. Two of them have been long known, and described by Rudolphi, Klein, and others, under the names of *Strongylus inflexus* and *S. minor*, whilst a third, from the circumstance of its being found in company with the *S. inflexus*, has, by many observers, and by Rudolphi particularly, been considered as a younger specimen of that species; and the fourth appears hitherto either to have escaped notice, or else to have been confounded with the last. The author's examinations of this Entozoon lead him to consider it as a distinct species, and from certain peculiarities he has named it *S. invaginatus*. The largest mentioned was *S. inflexus;* this species occurred most abundantly in the bronchial tubes, and in such numbers as almost to close them up, but many specimens were found in the right ventricle and auricle of the heart, and in the principal blood-vessels of the lungs as well. The average length of the male is about seven inches, whilst that of the female is nine inches. Our space will not allow us to enter into the minute anatomical details, which will doubtless be published elsewhere. The next species was found in common with the last, being twisted together in a knot around them, both in the bronchial tubes and blood-vessels; it has been noticed as the young of *S. inflexus*, but on comparison the author finds that the difference between the two is so marked, as to leave no doubt of their being distinct species. Kuhn has described it as *S. convolutus*. The third species is the smallest of the whole, and from this circumstance has been named *S. minor* (Quekett). It occurred in the venous sinusses of the heart, and in the cavity of the tympanum, and from living in blood they were of a reddish hue. The fourth species was found on the surface of the lung of a porpoise, the pleuritic investment of which was raised into little tubercles about the size of a small pea; and on cutting into one of them five very long and slender white worms were drawn out, one being much shorter than the rest, which was subsequently ascertained to be the male. On tearing a portion of the lung a vast number of these cysts were found imbedded in its substance, and in each one there were several worms coiled up in a very small compass; the cysts could be readily torn away quite entire from the surrounding tissue with the worms in them. After describing and detailing the structure of the male and female of each of the species above noticed, the author concluded the paper with alluding to some curious facts which present themselves for consideration. Entozoa, from the time of their first discovery to the present day, have exhibited more astonishing and wonderful phenomena than any other tribe of animated beings, and perhaps, throughout the whole kingdom of nature, no class has been so frequently the subject of opposite opinions, and on the matter of their generation we are now nearly as much in the dark as ever. In the various specimens mentioned above, there is, however, the startling truth of one and the same species of Entozoon living in such opposite media, viz., in blood and in air; for it has been above stated that *S. inflexus* was found in the bronchial tubes in the principal blood-vessels of the lung, even in the heart itself, in the venous sinusses at the base of the brain, and the cavity of the tympanum were literally

clogged with the *S. minor*. Now it cannot but be imagined that any animal so infested must, as a necessary consequence, have both the functions of respiration and circulation greatly impeded. Three porpoises examined by the author within the last three months have all had Entozoa, and these were all taken in the Thames; and the author considers it probable that this may be the reason of their leaving the ocean and running up the rivers at particular seasons of the year, and it would be curious to ascertain whether those taken at sea about the same period were so infested. The author considers also that some light may be thrown on the occurrence of Entozoa in particular parts of an animal, when they have been actually found living in the blood; and it may also be now readily imagined how the young, when emitted from the parent, can be transported to all parts of the body by means of the circulation, and analogy would lead to the conclusion that the blood of other animals may contain Entozoa as well as that of the porpoise. Another curious circumstance connected with these *Strongyli* is, that all the specimens of the four species are nearly uniform in their size; no young ones having been met with amongst them; these probably are yet to be found in other parts of the body, where the scrutinizing eye of the anatomist has as yet failed in detecting them. The paper was accompanied with drawings, showing the anatomical details described by Mr. J. Quekett.

A communication was then read from Dr. Thomas Williams, in which it was shown, that under natural circumstances the stomata are *openings unclosed* by membrane, as it was attempted to prove by the experiments of the Rev. Mr. Reade. This paper is inserted entire at page 118 of the present number.

Mr. Andrew Ross exhibited to the meeting his "Educational Microscope," an account of which was given at page 111 of our last number.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

August 5th, 1841.—*Sir Henry Marsh in the Chair.*

The minutes of the last meeting having been read, the Secretary informed the Society, that he had received a letter from Mr. Bergin, one of the members, in which he requested him to read before the present meeting, some notes relative to a curious animal, which had lately fallen under his notice for the first time. The notes were accompanied by four or five pen-and-ink etchings.

Mr. Bergin's communication was then read by Dr. Hill. In it he directed the attention of the Society to the beautiful though complicated organization of a small animal, which he believed to be a *hirudina*, though he was unable to give it a name, or to say to what species it belonged. He had found it in some water taken from a ditch in the Phœnix Park. One of the most striking peculiarities of this animal was the mode of its carrying its young; they were ten or twelve in number, and were attached by one extremity to the lower surface of the posterior third of the body of the parent animal; each pos-

sessed considerable extensile and retractile powers, and the whole presented much the appearance of a cluster of the tentaculæ of a polyp. The author described minutely the internal organization, mode of progression, and other peculiarities of the animal, and strongly recommended the members of the Society to make search for additional specimens, assuring them that they would be amply repaid by an inspection of this very curious and interesting creature.

Mr. Calwell exhibited a specimen of the animal described by Mr. Bergin, prepared in balsam: he stated, that he had more than once met with it, but was unacquainted with its name and history.

Dr. Hill mentioned, that a few days since, a specimen of the same animal had been given him, which was obtained from a pond in the county of Meath; and that, being unacquainted with it, he had forwarded it to Mr. Bergin, who happened to be engaged at the very time in inquiries relative to the same creature.

Dr. Hill then read a brief notice of some peculiar appearances exhibited at this season of the year by diseased wheat, when examined under the microscope.

Microscopical Memoranda.

Micrometers.—For the sake of those of our readers interested in the use of these instruments, we find in the *Bulletin de la Societé Imperiale des Naturalistes de Moscou, No.* 3, *Année* 1837, a paper by Professor Alexandre Fischer, "On the advantages of Micrometers in the Focus of the Eye Piece of Compound Microscopes, and on the mode of placing them;" but as our space does not allow us to enter into the details and formulæ, which occupy twenty-six pages, we must rest satisfied with referring only to the above quotation.

On Microscopic Vegetable Skeletons found in Peat, near Gainsborough, by Mr. Binney, of Manchester.—Mr. Bowman read a paper at the last meeting of the British Association on some skeletons of fossil vegetables, found by Mr. Binney, in the shape of a white impalpable powder, under a peat-bog near Gainsborough, occupying a stratum of four to six inches in thickness, and covering an area of several acres. It remained unchanged by sulphuric, hydrochloric, and nitric acids, and by heat, and was concluded to be pure silica, in a state of extremely minute subdivision. On submitting it to the highest power of the compound microscope, it was found to consist of a mass of transparent squares and parallelograms, of different relative proportions, whose edges were perfectly sharp and smooth, and the areas often traced with very delicate parallel lines. On comparing these with the forms of some existing *Confervæ* of the tribe *Diatomaceæ*, which are parasitical on other *Algæ* both marine and fresh water, but so minute as to be individually invisible to the naked eye, the resemblance was found to be so strong as to leave no doubt of their close alliance, if not perfect identity. Mr. Bowman considers them to be the counterparts of the

fossil Infusoria of Ehrenberg, and occupying the same place in the vegetable kingdom as those do in the animal.—*Ninth Report Brit. Assoc.* 1840.

Are the Closteriæ Animals or Plants? — Ehrenberg enumerates the following reasons for considering the *Closteriæ* as belonging to the animal kingdom. They enjoy voluntary motion, they have apertures at their extremities, they have projecting permanent organs near the apertures, which are constantly in motion, and they increase by horizontal spontaneous division. Dr. Meyen, who was of the opposite opinion, mentions, as the most important observations in favour of their vegetable nature, that their structure is exactly similar to that of the *Confervæ:* their formation of seed, and the development of this seed, is like that of the *Confervæ.* The occurrence, moreover, of amylum in the interior of the *Closteriæ,* with which they are frequently nearly filled, is a striking proof of their being plants; they have no feet. What Ehrenberg regards as such, are molecules, having a spontaneous motion, which occur in great number in *Clos. Trabecula,* and quite fill a canal the whole length of the plant. Their function is difficult to determine, but they also occur in very many *Confervæ,* and may perhaps be compared with the Spermatozoa of plants.—*Ann. Nat. Hist. Vol. IV, p.* 71.

Griffiths on Ephedra. — He is of opinion, that the ovulum is, as described by Mr. Brown, naked. The first species referred to had a very silicious stem, without stomata, unless certain discs blocked up with some hard matter (silex ?) are to be so considered; this he believes to be the correct view, inasmuch as the other species, which has no silicious deposit, has stomata of the ordinary structure arranged in a similar manner.—*Proc. Linn. Soc.* 1841.

Diameter of the Globules of Human Blood.—For the sake of reference, we insert the measurements of the globules of the human blood, given by various observers : —

Hodgkin	$\frac{1}{3000}$ of an inch.
Jurine	$\frac{1}{5240}$ .....
Jurine, in a 2nd measurement	$\frac{1}{1940}$ .....
Bauer	$\frac{1}{1700}$ .....
Wollaston	$\frac{1}{5000}$ .....
Young	$\frac{1}{6060}$ .....
Kater	$\frac{1}{4000}$ .....
Ditto	$\frac{1}{6000}$ .....
Prevost and Dumas	$\frac{1}{4076}$ .....

The thickness of the particles, which is perhaps not so uniform as the diameter of the discs, is on an average to this latter dimension, as 1 to 45.—*Hodgkin and Lister's Micros. Observ. on the Blood, &c., Phil. Mag. Vol. II, p.* 133.

XXVIII.—ON THE MINUTE ANATOMY OF THE LARVA OF ANTHOMYIA CANICULARIS.*

By Arthur Farre, M.B., F.R.S., &c., late Secretary to the Microscopical Society of London.

In this communication, Dr. Farre gave a detailed account of the anatomy of this rare parasite of the human body, only two previous instances of which he believes to be on record. His object was, however, briefly to describe its minute anatomy, with a view of showing the peculiar adaptation of its organs, particularly those of the digestive system, to the circumstances in which it is thus occasionally placed.

After alluding to, and detailing the instances on record of the existence of this parasite in man and the boa constrictor, which appears to have its analogue in the *Œstrus* or *Bot* of the horse and sheep, he proceeded to describe the larva, which is about half an inch long, by about one-eighth of an inch in breadth, of a dull brown or blackish colour, soft, flexible, and having a tough integument, which, however, is sufficiently transparent to allow the alimentary canal to be seen through it. The body consists of eleven segments, but the last is evidently formed of three blended in one. Each segment carries a pair of feathery appendages, which project at right-angles from the body, constituting a double row on either side. There is also a double row of smaller eminences extending down the dorsal surface, but the abdominal surface is nearly smooth. The lateral appendages, of which the upper series is formed, are much larger, and are pinnate; the central shaft of these, which is long and pointed, is hollow, and communicates apparently with the tracheæ. The lateral pinnæ are again pinnated on their outer margin. The integument, which appears smooth to the naked eye, is found, when examined under the microscope, to be granulated all over with minute dentiform or pointed processes, which appear to be of a harder nature than the rest of the tegument, and resemble, on a small scale, the osseous prominences in the tegument of certain cartilaginous fishes, as the sturgeon; and it appears to be only an extraordinary development of these little processes, which constitute the long feathery appendages already described.

The mouth of the larva is perhaps the most interesting part of its ana-

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* Abstracted from the paper read before the Microscopical Society of London, April 28th, 1841.

tomy. The head is furnished with two broad fleshy lips, which together constitute a broad disk, having in its centre a minute aperture, leading to the œsophagus, and flanked on either side by hook-shaped mandibles, the sharp points of which are directed downwards and somewhat outwards, every one can be nearly retracted into a separate sheath, the aperture in the extremity of each just allowing the point to protrude. Each of these broad fleshy lips is crossed by transverse parallel plaits or folds of membrane, about twenty-five in number, which, on their free margin, exhibit a delicately notched appearance, and in fact in every particular resemble a similar structure which is seen on a larger scale in the sucking disc, situated upon the dorsum of the head of the *Remora*, by which that fish is enabled to attach itself firmly to various objects. This structure, though similar to the instance just cited, is invisible to the naked eye. Dr. Farre imagines that this sucker enables the larva to fix its head, so as more readily to insert its hook-shaped mandibles into the soft mucous membrane of the intestine which it inhabits, and from which it draws its food. The mandibles are placed parallel to each other, with their hooked points directed downward, so as more easily to be inserted. They consist of three portions on either side. The first is hooked and sharp pointed, measuring only the $\frac{1}{60}$th of an inch in length. It is nevertheless furnished at the base with a delicately shaped ball, adapted accurately to a socket in the second joint, and has projecting from either side of its base a sharp spine or trochanter, for the insertion of the tendons of the abductor and adductor muscles, by which its movements are effected. The second joint bears the socket, to which the ball of the first is adapted, and at its opposite extremity it is united to the third and principal portion of the jaws, which consists of a broad expanded corneous plate, of less density than the preceding, and resembling in form and office a similar structure, well known as occupying the centre of the large claw of the lobster, being for the attachment of the muscles by which the mandibular hooks are moved to and fro. The whole mandibular apparatus measures about the $\frac{1}{16}$th of an inch in length, and being very fine and solid, presents a remarkable contrast in texture to the surrounding soft parts with which it is connected, and from which it is easily detached.

If the body of the insect be laid open, the alimentary canal is seen to be of considerable length, and much convoluted. It commences by an exceedingly delicate hair-like œsophagus, so narrow that it would appear to be specially destined to transmit fluid nourishments, and nothing else. It terminates about the third segment of the body, in a minute globular cavity, or proventriculus, which is of the same diameter

as the rest of the alimentary canal, and immediately below which four very short salivary vessels enter. From this point commences the large intestiform stomach, which, after contracting in its first third to the finest thread, again dilates, and proceeds of uniform diameter to the point where the four slender biliary vessels enter, where it again contracts, and forms a short intestine. The whole alimentary canal is about six times the length of the body, and of this length the stomach forms about $\frac{5}{6}$ths. Its greatest diameter does not exceed one-third of a line, and its least is that of a mere thread. The whole structure appears to be that of an animal adapted to live on fluid nourishment.

The only extreme openings to the tracheæ, appear to be two apertures situated on the dorsum of the last segments of the body, and which constitute the last pair of the series of dorsal eminences formerly noticed.

The author concluded by offering some speculations as to the mode in which the larvæ could have obtained admittance into the intestine; the great difficulty being to account for their vast number—some quarts in one case, and several hands-full in another; while it was impossible, from their being in the larva state, and having no generative organs, that they could have been propagated in the alimentary canal. The singular adaptation of their digestive organs to a parasitic life was contrasted with the extreme rarity of their occurrence in those situations in which they appear best fitted by organization, viz., in the intestines of man or animal. As throwing some light upon this point, the singular and important fact which was observed at a period shortly subsequent to these observations, was related, viz., the accidental discovery of some specimens of the same larva, though in a younger state, in some New River water, brought by the usual service pipes, which supply the metropolis with water.

XXIX.—ON THE SILICIOUS BODIES OF THE CHALK, GREENSANDS, AND OOLITES.

By J. S. Bowerbank, Esq., F.G.S.

[Continued from page 115.]

The results arising from the various forms of flint which have been described, induced me to believe that the flint-cases enveloping the numerous and beautiful specimens of sponges and corals of the Wiltshire chalk, would probably prove to have originated in a similar manner to

the forms of flint before described, I therefore requested Mr. John Baker of Warminster, who collects large quantities of these beautiful fossils, to furnish me with some, the interior surfaces of which had not undergone the usual process of washing and brushing. Having cleaned these carefully, by pouring into them a small stream of water, I observed spicula projecting from all parts of the interior surface; and the same appearance was exhibited to a greater or less extent in more than twenty specimens which I examined, however different in character the sponge or coral enclosed within the flint might have been; the spicula appearing to have no reference whatever to the bodies thus enclosed, none of them being found upon the included body, but only upon the case. When microscopically examined, the interior surface of these flint-cases presented in every respect the same appearance as that exhibited by the under surface of the tabular flints; and there are generally fragments of minute corals, small *Terebratulæ* and other shells attached to the inner surface; and in the same case there are frequently two, and sometimes three, different species of coralline or spongeous bodies; thus proving that these beautiful Wiltshire specimens are merely extraneous bodies which have been built over and enveloped by the common coating sponge of the chalk. Many of the contained bodies also present evidence of their having been exposed some time previous to being thus enveloped, as we frequently find upon their surfaces patches of *Flustra*, which are in the habit of seating themselves upon dead or inorganic matter. Thin sections of the cases of the Wiltshire fossils exhibit the characteristic *Foraminiferæ* and spicula, as well as the common species of *Xanthidia*.

It may be objected to this mode of accounting for the envelopment of sponges and corals by the common casing sponge of the chalk, that the enclosed bodies are usually almost in the centre of the flint, which would not be the case, if they had been dead specimens lying at the bottom of the ocean at the time they were built over; but in reply to this it must be remembered, that although dead specimens, they most probably retained the position in which they lived, until the extraneous mass surrounding them might alter their centre of gravity, when they would fall on one side, and their bases would then, in all probability, be built over in the same manner as the remainder of the mass. In many of these bodies, also, there are portions of the enveloped sponge or coral which have never been invested, and in numerous instances there are orifices remaining in the flint-cases through which the roots of the enclosed body have passed out, and which were probably pre-

served from being built over, either by being buried in the soft mud, or by being attached at the bottom of the ocean.

The tubuli of the flint-sponge are very minute: an average of the measurements of four well-defined tubes upon the surface of a common flint gave the $\frac{1}{1268}$th of an inch as the diameter; the smallest of these was the $\frac{1}{1575}$th, and the largest the $\frac{1}{800}$th of an inch in diameter. In the cast of an *Ananchytes*, five which were measured gave an average of $\frac{1}{652}$nd of an inch; the smallest of these being the $\frac{1}{778}$th, and the largest the $\frac{1}{510}$th of an inch in diameter. In the cast of a *Galerites albogalerus*, in which they were in a very beautiful state of development, a measurement of seven gave the $\frac{1}{855}$th as the average; the largest being the $\frac{1}{752}$nd, and smallest the $\frac{1}{980}$th of an inch in diameter. The tubuli in this specimen were hollow; and one of them, which had been broken at a right angle to its axis, gave the following measurements: external diameter $\frac{1}{980}$th, internal diameter $\frac{1}{1852}$nd of an inch; thickness of the substance of the tube $\frac{1}{4167}$th of an inch. In their size and proportion the tubes agree very nearly with those of the recent sponges. The average diameter of the fibre of the common sponge of commerce is about the $\frac{1}{1130}$th of an inch, and in the sponge from New South Wales the diameter varies from the $\frac{1}{971}$st to the $\frac{1}{472}$nd of an inch. The spicula are large in proportion to the other parts of the tissue, very frequently exceeding the eighth or tenth of an inch in length. They are thinly scattered, and usually acicular in their form; but sometimes they are forked or branched, but this is comparatively a rare character. They do not occur in fasciculi, as in *Halichondria*, but are usually solitary, or a few are grouped together. They are mostly of an elongated, spindle-formed shape and somewhat curved, as represented in fig. 1, which exhibits them in their natural position, on the interior surface of a flint from Wiltshire; or in fig. 2, which gives a series of the largest of them, separated from the white friable silicious matter from the interior of one of the Wiltshire flints.

Fig. 1.

Fig. 2.

The results arising from the examination of the flinty bodies of the chalk, induced me to believe that the cherts of the greensand formations and of the oolites, would probably prove to be of a similar origin.

I therefore examined thin slices of specimens of chert from the upper greensand pits of Fovant in Wiltshire, in the manner pursued in the investigation of the flints ; and I found, as I expected, the result to be of a similar description ; but in this substance the spongeous fibre is of a much coarser texture than in that of the chalk-flint, and the interstices of the net-work very much larger in proportion. The imbedded extraneous matters are also of a larger description, such as small fragments of apparently very fine branched vegetables, &c., in addition to *Xanthidia* and other small organic bodies. The form and mode of ramification of the tubular structure approaches nearer to those of the fibre of the common Mediterranean sponge, than in the flint spongite. The tubes are seen dispersed in about an equal proportion through the whole mass of the chert. They are very pellucid, and would probably escape observation, if it were not that their surfaces are covered with a short downy-looking structure, which gives them very much the appearance of minute portions of a very transparent *Fucus*, when viewed as a transparent object with a microscopic power of fifty linear. Sometimes, but very rarely, portions of the tubes remain hollow, and they then display a very distinct and characteristic appearance, which represents a portion of the tubes under these circumstances, as they appear when viewed as opaque objects, with the aid of a leiberkuhn. The average measurement of five of these tubes gave a diameter of $\frac{1}{344}$th of an inch; the largest being the $\frac{1}{276}$th, and the smallest the $\frac{1}{484}$th of an inch.

The cherty nodules from the upper greensand of Shaftsbury presented appearances exceedingly similar to those observed in the specimens from Fovant. The black and semi-transparent mass of chert in the centre was surrounded by a coating nearly an inch in thickness, which had the appearance of agglutinated sand ; and the outer surface of the coat assumed an eccentric tuberous form, very similar to that of the chalk flints.

Upon microscopically examining the structure of this coat, as an opaque object, numerous contorted canals of various sizes were observed, and beautiful green spicula were visible imbedded in considerable numbers in the mass. It would therefore appear, that the same process went forward during the imbedment of this sponge, which we have supposed to have taken place during the envelopment of the sponge which originated the chalk flints ; but the sponge, in this instance, being of a coarser and more open nature, it has been penetrated by the surrounding fine sandy matter to a greater proportionate depth than in the case of the chalk flints. Two casts of *Spatangus* in chert, from the upper greensand pits at Shaftsbury, presented results analogous to those obtained by the examination of the flint casts from the chalk ; the surfaces

exhibiting numerous tubes and spicula, which corresponded in size and appearance with those shown in the thin sections represented by fig. 1, Pl. XIX. (in Mr. B.'s paper), so that little doubt can exist of the formation of these casts being similar to that of the chalk flints.

Upon examining in the same manner a number of slices from a great variety of masses of chert belonging to the greensand of Lyme Regis, nearly the same appearances were presented as those afforded by the chert of the upper greensand of Fovant. A group of tubuli are represented in Mr. Bowerbank's paper; and their size, mode of disposition, as well as general character, so closely resemble those of the upper greensand, that there is strong reason to believe the sponge to have been of the same species, or very closely allied to it; and it was only when they were examined as transparent objects, with a power of 360 linear, that I could detect any evident difference. Under these circumstances, the tubes of the former present the semblance of a mucous surface, with minute irregular particles of opaque matter adhering to them, while the tubes of the latter exhibit an appearance as if minute patches of a thin epidermal membrane had been partly detached from their surface; but this trifling variation in the appearance of the organic structure may probably have been caused by a slight difference in the circumstances attending their fossilization. The tubuli vary in their size to about the same extent as those of the upper greensand spongite, but their average diameter is as nearly as possible the same.

The dimensions and external form of the masses of chert in the greensand of Lyme are widely different from those of the upper greensand, and would seem to indicate a specific difference, but the resemblance of their internal structure evinces a very close alliance in every other respect. Two specimens of chert from the oolite, one being from the Tisbury limestone, and the other from the Portland, afforded similar strongly-marked evidences of organized structure; but with this difference, that in these there appeared to be a greater quantity of the cellular structure of the sponge preserved than in any of the former instances; and the appearances afforded by the structure, in both cases, were nearer to those of the fresh-water sponge than any of the fossil sponges of the chalk or greensands, with the exception that there were fewer spicula than in the recent fresh-water species. When small portions of dead and decomposing fresh-water sponge were immersed in Canada balsam, and examined microscopically in the same manner as the silicious slices, the appearance was so similar to that of the fossils, as to prove at once that the oolitic cherts derived their origin from decomposed spongeous masses.

XXX.—AN ABSTRACT OF THE "INFUSIONSTHIERCHEN" OF EHRENBERG.—No. 3.*

By W. Hughes Willshire, M.D., M.B.S., Physician to the Fore Street Dispensary, &c.

Genus—MONAS.

EYE, projecting lip, and tail not present; mouth terminal truncated, provided with cilia, or with a flagelliform filament, which is sometimes double, and presented towards the direction in which the animalcule is swimming; dividing by spontaneous self-division bipartitely, or not dividing at all; solitary, not clustering or aggregate.

In general, the species of the genus Monas are with difficulty accurately determined; as the young of other genera, of BACTERIUM, VIBRIO, UVELLA, POLYTOMA, PANDORINA, GONIUM, and of many others, for instance, when they have separated from their clusters, or parted with their common envelopes, are very liable to be mistaken for them. A single individual, except observed under the act of self-division, can scarcely ever be specifically, or sometimes even generically determined; and when an observer happens to meet with but very few minute moving points in a fluid he may be examining, he must often rest contented with an *approximation* to the truth. Should the fluid, however, contain great numbers of them, his decision will be easier and more decisive, from the numerous and manifold vital relationships exhibited to them. The following rule, however, may serve to guide the investigator:—Suppose that in a drop of water containing species of the genera VIBRIO, BACTERIUM, UVELLA, or POLYTOMA, easily recognisable from their states of aggregation, you observe amongst them solitary Monad-like forms, you may with great probability affirm that the latter are but solitary individuals, or the young of the aggregated ones; and should their size and that of the separate creatures forming such aggregation not be materially different, the conclusion would be generally correct. The same rule equally applies to the green Monad-like forms observed amongst Pandorina and Gonia. Chlamidomonas pulvisculus in the young condition is very deceptive, being very often liable to be mistaken for an eye-less and illoricated green Monad.

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* Our limits will not admit of any further analysis of the characteristics and organization of the Infusoria than the present paper exemplifies; which is the more to be regretted, as in the present instance, the strict awardment to Ehrenberg, of the credit for the facts which his industry has accumulated, is especially necessary.

Twenty-five species of the genus Monas are at present known (Ehrenberg enumerates twenty-six, but remarks, that one of them more properly forms another genus); two are of a green colour, two yellowish, two inclining to red, and the remaining eighteen are colourless. Those possessed of colour are most easily recognizable, but it must be remembered, that *colour* is not a sure characteristic.

Genus—Uvella.

Eye, projecting lip, and tail not present; mouth terminal truncated, provided with cilia, or a flagelliform and delicate proboscis (double?), in the solitary individuals presented towards the direction in which they are swimming; dividing by spontaneous self-division bipartitely, or not dividing at all, and aggregating *voluntarily*, at certain periods, into grape or mulberry-like clusters, which, when in motion, *roll*. The solitary animals do not *roll*, but progress in the direction of the longitudinal axis of their body. Six species are known: two are of a green colour, the remainder are colourless.

Genus—Polytoma.

Eye, projecting lip, and tail not present; mouth terminal truncated, provided with cilia, or a double flagelliform proboscis, in the solitary individuals presented towards the direction in which they are swimming; spontaneous self-division for some time decussating multipartite and imperfect, giving rise to a mulberry-like appearance of the body; afterwards perfect, and forming separate animalcules.

This genus is mainly characterised from Uvella, by the temporally incomplete condition of division, the species of the latter dividing completely and very soon, or else not at all. The solitary creatures in Uvella cluster voluntarily together, and roll along in a berry-like form; each separate animalcule rolls in unison with its clustering neighbours. In Polytoma a general motion is impressed upon the whole mass together. The former resemble flocks of birds and herds of animals; the latter moving coralline clusters. One species is known, this is colourless.

Genus—Microglena.

Projecting lip, and tail not present; eye present; mouth terminal truncated, provided with a simple delicate flagelliform proboscis, presented towards the direction in which the creature is swimming; spontaneous self-division simple, perfect, and bipartite, or none.

This genus is characterised by the presence of a red point at the an-

terior portion of the body, and which is here regarded as a visual organ; in other respects it possesses the characters of the true Monads. Two species are known; one is of a yellow, the other of a green colour. (I may remark, that Ehrenberg, in his *tabular* analysis of the family Monadina, allots either one or two proboscides to MICROGLENA, whilst here he affirms it is simple.)

Genus—PHACELOMONAS.

Projecting lip, and tail not present; eye present; mouth terminal truncated, provided with numerous (8—10) cilia or filiform proboscides, presented towards the direction in which the creature is swimming; spontaneous self-division simple, perfect, and bipartite, or none.

The more essential character of the genus is the presence of numerous delicate proboscides, placed around the oral aperture, and which form a cilia-wreath.

One species is determined, and is of a green colour.

Genus—GLENOMORUM.

Projecting lip, and tail not present; eye present; mouth terminal truncated, provided with a double filiform proboscis, which, in the solitary animalcules, is presented towards the direction in which they are swimming; dividing by spontaneous self-division bipartitely, or not dividing at all; clustering or becoming aggregate at certain periods, assuming the form of a mulberry or a bunch of grapes.

The genus comprehends but one species (first described as *Monas tingens*); it is very nearly related to the genus CHLOROGONIUM, of the family ASTASIÆA, and through this to AMŒBÆA; the species is of a green colour.

Extracts and Abstracts from Foreign Journals.

[From *Müller's Archives*, 1841.*]

On the Rotary Movements of the Yolk in the Ovum of Mammalia, during its passage through the Fallopian Tube. By Professor J. L. W. Bischoff, of Heidelberg.—The attention of Professor Bischoff was called to this phenomenon by an observation of Dr. Martin Barry, in the Philosophical Transactions for 1839. Dr. Barry there mentions having on one occasion met with an elliptical vesicle (filled with a transparent

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* The two following articles are extracted from the London and Edinburgh Monthly Journal of Medical Science. October 1841.

fluid in which were small elliptical granules), adherent to the mucous membrane of the Fallopian tube. In the centre of this vesicle was a mulberry-like body which continued rotating on itself for half an hour, the rotation subsiding by degrees into a tremulous motion. Professor Bischoff was of opinion, that this vesicle was an ovum, and the rotating body its yolk, and he adduces an observation in corroboration of this supposition.

Having carefully laid open, with a pair of fine scissors, the Fallopian tubes of a rabbit, which had been placed with a male during the previous eight days, he found four ova close together, about the middle of the tube of the left side. Within the zona pellucida of these ova was the yolk which, however, did not completely occupy its area, but between the yolk and the inner surface of the zona a transparent fluid intervened. In this fluid each yoke-ball continually rotated on its own axis, in the direction from the uterus to the ovary. On examining the ova with a power of 800 diameters, the surface of the yolk was seen to be furnished with very minute ciliæ, by the vibration of which this movement was effected. Professor Bischoff convinced himself, by very careful examination, that the ova themselves remained perfectly still during the continuance of this rotatory motion of the yolk, which ceased on the preparation being moistened, in order to prevent the ova from drying up.

In this phenomenon Professor Bischoff sees a fresh point of coincidence between the processes of development in mammalia and in other animals, since similar rotatory movements of the yolk have been observed in the ova of mollusca and polyps, and recently by Von Siebold and Ehrenberg in those of medusa aurita.—*Heft.* 1.

On the Formation of Contagious Confervæ (?) on Living Frogs. By Dr. Stilling, of Cassel.—The facts stated in the paper of Dr. Stilling are derived from observations on several hundred frogs, made in 1839 and 1840, while the author was investigating the influence of the nerves on the circulation of the blood.

In the course of his experiments, Dr. Stilling frequently removed the greater part of the under half of the spinal cord, closing the wound afterwards with sutures. Frogs thus treated, continued to live for months, if placed in flat vessels, sufficiently shallow to enable them to breathe, by raising themselves on the fore-legs, and thus bringing their mouths above water. At an indefinite time after the operation, however, the tips of their toes frequently put on a whitish appearance, as though they had been dipped in hot water. This condition always shewed itself first on the toes of the hind feet. The extent of surface thus affected was sometimes extremely small, but in other instances the last joint of the toes, or the last two joints, were involved. The epidermis in these situations appeared to be much thickened, of a whitish grey colour, and could easily be wiped off, when it left the true skin denuded, but perfectly smooth. On the following day the diseased epidermis would be reproduced; and it might for several days be thus renewed at pleasure. If left to itself, however, very fine filaments, in close apposition with each other, resembling mould, sprout up with such

rapidity, that, when the weather is warm, an efflorescence several lines in length covers the affected parts of the living animals in the course of two days. After the animals had died, provided their bodies were kept in water, the efflorescence grew to an inch and a half in length in four or five days.

If the efflorescence was allowed to remain on the toes, for two days or more, without being wiped off, it became much less easy to remove it, and after it was detached, the subjacent skin was seen to be excoriated, reddened, and ulcerated. From the first appearance of this affection, the health of the frogs was always sensibly impaired, but nature in every case attempted a cure. This consisted in an exfoliation of the skin, which took place very rapidly, though it was seldom complete, since the paralysed and sickly animals were unable to free themselves from the epidermis. If the efflorescence was left untouched, it extended very quickly on the toes, and likewise appeared on various other parts, as the fore-feet, the fore-arms, thighs, and edges of the mouth, in which last situation it always proved fatal. Nearly the whole surface of the body would thus become covered by this growth, which continued to increase for four or five days after the death of the animal, but afterwards it changed its appearance, and became converted into a slimy mass of a whitish yellow colour. In most instances, this efflorescence appeared between the fourth and sixth day after the injury to the cord, sometimes on the second day; in a few instances, not until the fifth, sixth, or twelfth week. A careful removal of the morbid epidermis, and washing the part daily with water, prevented the extension of the disease, and sometimes effected its cure, but it always had a great tendency to return, and occasionally reappeared after an interval of three months.

When examined under the microscope, this efflorescence was seen to be made up principally of long tubes, seldom ramified, but frequently dichotomous, and filled more or less completely with black granules. Their breadth was usually 0.00065 of a Paris inch. They varied in length, usually terminating in a cone, though occasionally they had a club-shaped extremity. The granules were 0.0001 of an inch in diameter, transparent in the centre, with a black well-defined edge. Dr. Stilling was much surprised at observing an independent motion in these black granules, and was for some time at a loss to account for the occurrence. These movements occurred among the granules contained in the tubes, the whole of the contents of which were sometimes in independent motion; sometimes only a small part of their contents moved, while the remainder were motionless. Similar movements were observed in some of the granules which had escaped from the tubes. By a careful examination of these latter, Dr. S. satisfied himself that they were ova, from which very small acicular Infusoria issued. The movements of these granules are supposed by him to be owing to the efforts which the animals make to escape from the ova, since they were frequently seen moving about with the granules attached to their head. In the course of a day or two these animals became much less numerous, and their place was supplied by others, which, instead of a simple vibratory motion, executed very rapid serpentine movements.

The disease was capable of being propagated by inoculation to salamanders, lizards, and unhealthy frogs; but frogs in health did not appear to be affected by it.

The real nature of the tubes, in which the granular contents were observed, still remained unsettled. But, after ascertaining that these contents were precisely similar to the matter produced by the decomposition of dead frogs, and that they consisted of the ova of Infusoria, it became evident that, notwithstanding their apparent resemblance to Confervæ, the notion of their vegetable nature was untenable. Most probably the tubes are an albuminous or fibrous structure, which forms a sort of nidus, in which the numerous ova become developed. The cellular structure which has been perceived in them does not militate against this supposition; for the imaginary cells are verticillæ, which Dr. Stilling has frequently seen burst, and discharge their contents.

Dr. Stilling concludes, that,—as in the case of frogs whose spinal cord has been injured,—the serious local disturbance of the vegetative processes of any part, especially where a state of previous debility existed, induces the excretion of a peculiar organic substance (albumen or fibrin), which is favourable to the development of the ova Infusoria. He dissents, therefore, from Hanover's opinion of the vegetable nature of this efflorescence, which either is essentially different from the muscardine, or, which perhaps is more probable, the vegetable nature of the muscardine is merely apparent, and further investigations will prove it to be of animal origin, the result of the development of Infusoria.—*Heft.* 3 & 4.

[From the *Annales des Sciences Naturelles*, April 1841].

Duvernoy and Lereboullet on the Respiratory Organs of Crustaceous Isopoda, (concluded.)—The conclusions which these authors have arrived at, relative to their natural history, systematically or classifically considered, are:—1. That the abdominal position of the organs of respiration, or the suspension of these organs as appendages to the rings of the abdomen, is the only common character which exists in all the families of this order, such as are limited to the classification which we have followed. 2. That in attending to the characters afforded by the position, form, and structure of the branchial apparatus, the first six families may be grouped together, under the name of *Normal Isopoda.* They approach each other by the relation of their organs of respiration, by the sub-abdominal position of branchial organs, and by their general structure; this apparatus being formed of branchial vesicular plates, covered over by protecting lamellæ or opercula.

The second group, that of the last three families of *Bopyridæ, Keponidæ,* and *Ionidæ,* form the *Abnormal Isopoda.* They are devoid of opercular plates, properly speaking, to protect the branchial organs. The *Bopyridæ* is the only one which has them entire and beneath the abdomen. The *Ionidæ* have them of an arborescent form, floating around the abdomen; a double character, altogether abnormal among the Isopoda. The *Keponidæ* have them intermediately between these two fa-

milies ; in part sub-abdominal and entire, or nearly so, in part floating around the abdomen, and fringed. But, in this last family, the sixth pair of floating abdominal appendages, is likewise converted into branchia ; this does not take place in any other of the Isopoda. 3. It may also be concluded from the facts detailed, that the situation, structure, and general form of the respiratory apparatus in the *Crustaceous Isopoda*, is the same in each family. 4. That certain genera exhibit in their respiratory organs peculiarities of structure common to the best characters which can at present be made. Such is the genus *Porcellio*, which cannot henceforth be distinguished from *Oniscus*, except by the absence of an articulation in the external antennæ, but still more by the presence of a white body in the first pairs, at least, of the opercular lamellæ of its respiratory apparatus. 5. Lastly, a single genus, viz. *Tylos*, composed of only one species, is distinguished by the singular modifications in the structure of its respiratory system, of which the knowledge already detailed by M. Milne Edwards, leads us to think it ought to form the type of a distinct family.

A plate, containing seventeen figures, illustrates in detail the researches of these authors.

Flourens's new researches on the Action of Madder on Bones.—In a previous memoir, the author gave the results of his researches on the action of madder to enable the observer to follow the development of bones in thickness. This Duhamel and Hunter have done before him, but not to so great an extent. Neither of these philosophers have thought of profiting by the action of madder in separating and following the gradual development of bones in length. We have alluded to it here, in consequence of its physiological interest ; the paper is worthy of attentive perusal.

Rusconi's observations on injecting the Lymphatic Vessels of the Salamander and Frog.—The previous part of this communication is not microscopic. "If," says M. Rusconi to M. Breschet, "you are desirous of pursuing researches on the lymphatic vessels of *small animals*, I would suggest the impropriety of making use of the injecting tubes of Sœmmering, and also of not using mercury, because that metal, by its weight, easily ruptures the tissues of small animals, finds its way out of the vessels, extravasates, after having dilated beyond their usual size, the canals in which it was in the first instance introduced ; in a word, it alters everything. Instead of mercury, make use of coloured wax, red or blue, and mix with it nut-oil, in greater or less quantity, according to the temperature of the season, and perform your injection with a small syringe. I can assure you, after much experience, that you will be satisfied."

Rusconi's method of dissecting small Embryos.—In the same paper, he continues, "At the last meeting of Naturalists which took place at Turin, I read a short paper on the method I adopt to dissect very small embryos. It consists of imbedding them in wax, in a manner similar to the diamond, previous to its being polished by the lapidary, then dissecting the embryos beneath water, after having lightly washed them with an acid solution, composed of one part nitric acid,

and eight parts of water. It is with the assistance of this anatomical process that I have followed the development of the brain of the frog, and I much regret that Professor Serres was not acquainted with it at the time when he made his observations on the brain in the four classes of vertebrated animals. If he had known of it, he would not, as he himself says, have had so many obstacles to conquer, to follow the formation and successive changes of the brain and spinal cord of the Tadpole."

Van der Hoeven on the Blood Globules of Cryptobranchus Japonicus.—On subjecting the blood of this animal to examination under a simple microscope and lens of medium power, he perfectly recognised the oval globules with their nuclei. With the assistance of Plœssl's microscope, he ascertained that the globules measured $\frac{1}{19}$ of a millimetre, or $\frac{1}{42}$ of a line in length, by $\frac{1}{30} - \frac{1}{32}$ of a millimetre, or $\frac{1}{65}$ of a line in breadth. With a power magnifying about eight times, the globules might be distinguished; and one of twenty-seven times was sufficient to discover the nucleus with clearness. The *Cryptobranchus Japonicus* is then, after the *Proteus*, a second example of a vertebrated animal with very large corpuscles or blood-globules.

V. Audouin's remarks on the Phosphorescence of some Articulated Animals, occupies the three remaining pages of the Zoological part of the April number.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

September 22d, 1841.—*R. Owen, Esq., F.R.S., President, in the Chair.*

The Secretary, Mr. J. Quekett, made some observations on four species of Epizoa, which he had obtained from a common water-rat. He stated, that the vermin which infested the bodies of most, if not of all, animals, are principally referred to the order of insects termed Parasita by Latreille, but Anopleura by others, and are characterised by having six legs, no wings, and their sense of sight consisting of four or two small ocelli; their mouth is internal, and exhibits on the outside a snout enclosing a retractile sucker, or two membranous lips, with two hooked mandibles. Of the four species only one came under the order Parasita, the other three having each eight legs, and appeared to belong to the genus Acarus. One of them was very small, with a slender body, marked with transverse rugæ, and a head of a brown colour; the eggs of this species were found in abundance on the hairs. A second species was provided with curious hook-like appendages at the end of each leg, its body was of a globular figure, and its colour light yellow. The third species was of a pinkish hue, and only seven of them were found, and these in the ear of the animal; whilst the last was the largest of the whole, and of a brown colour: it had six legs and a pair of antennæ, and differed very little in shape from the Pediculus of the human subject; it was the most abundant of the four, and the only one that belonged to the order Parasita.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

September 2nd, 1841.—*T. F. Bergin, Esq., in the Chair.*

The minutes of the last meeting having been read,

Mr. Yeates exhibited several specimens of Daguerréotyped microscopic objects, prepared according to a modified process recently adopted in Paris.

Mr. Ball exhibited a fragment of a Spongiform silicious body, given him by Mr. Stutchbury of Bristol, for examination. In the interstices of this substance are numerous regular forms, which Mr. S. seems to consider as granules of sponge; they appear to consist of cylindrical tubes, radiating in every direction from a common centre. They are objects of much beauty and interest, somewhat resembling *Xanthidia.*

Microscopical Memoranda.

Note on Preserving Valisneria.—It is very generally known to those observers who keep Valisneria for microscopic purposes, that in the course of a short time the whole plant becomes covered with a very delicate Conferva, or some nearly allied genus; to remove which, it has been recommended to place a few fresh-water snails, such as the species of *Limneus, Planorbis, Physa,* &c., to be met with in plenty in almost every stagnant pool or ditch. We are informed by Mr. George Busk, that Gold and Silver Fish placed in the water with the Valisneria, is an effectual means of keeping under the growth of the Conferva, besides having a more elegant appearance than Pond Snails.—*Editor.*

On an improvement in the Polarizing Microscope.—Sir D. Brewster's improvement consists in placing the analysing prism, or simple rhomb, immediately behind the object-glass; that is, on the side of the object-glass next the eye. The great inconvenience of placing it between the eye-glass and the eye, has induced several skilful observers to reject the prism altogether as an analyser, or to substitute for it a plate of tourmaline, which is quite unfit for any observations in which colour is to be considered. The analysing prism may remain constantly on the microscope behind the object glass, without in the least injuring the performance of the microscope; and it should have a motion of rotation independent of the body of the microscope.—*Rep. Brit. Assoc.* 1840.

[This supposed improvement has for many years been adopted by Mr. J. T. Cooper.—*Editor.*]

Organic nature of Glairine.—Dr. Daubeny, at the late meeting of the British Association, stated, that D'Anglada, an Italian chemist, had spent much time in the investigation of Glairine, and believed it to be the produce of chemical action in the waters. He had long since come to the conclusion, that glairine was an organic product; and in his Report on mineral and thermal waters, presented to the Association at Bristol, had stated this as his opinion.—*Athenæum Aug.* 7, 1841.

XXXI.—OBSERVATIONS ON PARASITICAL GROWTHS ON LIVING ANIMALS.

By George Busk, Esq., Surgeon to the Hospital Ship, Dreadnought, &c.

THE occurrence of parasitical growths, or of organized productions, having a close analogy with some forms of cryptogamic vegetation, upon the surfaces or within the substance of living animals, and in many instances constituting the cause of disease, is a subject of considerable importance in pathology; and although it would be out of place in these pages to enter into the pathological relations of these affections, yet as the microscope has been the means by which the few facts as yet ascertained in this matter have been brought to light, it may not, perhaps, be deemed irrelevant to the object of the MICROSCOPIC JOURNAL, to admit a short statement of what has been observed, and thus to bring into one point of view, and attract the attention of microscopists, to a probably not unfertile field of investigation.

1. On the 28th of August, 1832, Mr. Owen read some notes before the Zoological Society on the anatomy of the Flamingo, *(Phœnicopterus ruber)*, in the lungs of which bird he found numerous tubercles and vomicæ, the inner surface of which latter was covered with a greenish vegetable *mould* or *mucor*. Mr. Owen presumed that the growths had taken place during the life of the animal, and thence concluded that internal parasites are not derived exclusively from the animal kingdom, but that there are *Entophyta* as well as *Entozoa*.*

2. In the year 1835 a disease to which silkworms are subject, known under the name of *Muscardine*, was first described by M. Bassi of Lodi, and M. Balsamo, a botanist of Milan. They ascertained that this disease was owing to the growth, on or within the body of the caterpillar, of a cryptogamic vegetation. M. Audouin, in 1836 and 1837, in a paper entitled "Anatomical and Physiological Researches on the contagious disease which attacks silk-worms, and which is designated under the name of *Muscardine*,"† described a series of experiments on the chrysalis of *Bombyx Mori* thus affected, and which he had received from M. Bassi. He was able to follow in detail the transformation of the

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* Philosophical Magazine, 1833. New Series, Vol. II, Page 71.

† Annales des Sciences Naturelles, Vol. VIII, New Series, Page 229, Pl. 10, 11.

fatty tissue of the insect into radicles (thallus) of the cryptogamic vegetation, to which he gave the name of *Botrytis Bassiana.** (Pl. 1. fig. 4.)

3. The next observation is that of M. Des Longchamps,† in a paper "On the habits of the Eider duck *(Anas mollissima)*", in which he describes the occurrence of layers of *mouldiness* developed during life, on the internal surface of the aerial cavities of one of these birds, which he examined on the 2nd July, 1840, while yet warm. This vegetation occurred in the form of flakes or layers, deposited in great numbers on the walls of these cavities. Most of these plates, or layers, were circular, and they varied in size from two or three millimetres to several centimetres. The small bronchial tubes were covered with them in great abundance. Two kinds of these plates or flakes were observed. Beneath the larger ones the membrane upon which they were situated was uniformly reddened and thickened; beneath the smaller ones, towards the centre, a vascular net work was seen, surrounded by a zone, in which the vascularity was less distinct, and beyond this zone the vascularity was again increased, but in less degree than in the centre. The colour of the smaller flakes was a dirty white; the larger ones were also white, but greenish in the centre. The border of the larger flakes was irregular, which irregularity evidently resulted from their being formed by the confluence of several adjoining smaller flakes. Examined under the microscope, this mouldiness appeared to be composed of transparent non-articulated filaments (Plate 1, fig. 3), slightly, if at all branched, and intermixed like the fibres of felt. These filaments, imbedded in a layer of albumen, were in parts scarcely the $\frac{1}{200}$th of a millimetre in diameter. M. D. further observed numerous ovoid or globular vesicles in the felt-like mass, of the same diameter as the filaments, which vesicles he looked upon as sporules. These growths appeared to have no immediate connexion with the living tissue.

4. A mouldiness of a different kind was also observed by MM. Rousseau and Serrurier‡, which they describe as being found not unfrequently in pigeons and fowls, particularly in cold and humid situations, or in rainy seasons. These observers found it in the body of a male

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* For further observations on this disease, vide a paper by M. Johanny, Annales des Sciences Naturelles, Vol. XI, Page 65, 80; and one by M. Crivelli, in Schlectendahl's Linnæa, 118, 123; and by M. Bonafous, L'Institut, No. CCLXXIX, Page 154; and Henle's Pathologisch. Untersuchung.

† Annales des Sciences Naturelles, June 1841, Page 371.

‡ Comptes Rendus, 1841.

parroquet, which died of a tubercular disease, in a sort of false membrane between the intestines and vertebral column, which membrane was covered with a greenish pulverulent mouldiness, so light, and so little adherent, that it could be blown off as a fine powder. They further state, that a similar affection has been noticed by them in animals of other classes, as in *Cervus Axis*, and *Testudo Indica*.

5. In 1839, M. Schœnlein* announced the fact of the existence of *Mycodermata* in the crusts of *Tinea favosa*. Priority, however, in this observation, is claimed by M. Remak,† who says that he made it as far back as 1836, when he stated that *Tinea favosa* consisted of fungoid filaments.‡

On the announcement of Schœnlein's experiments in 1839, they were repeated by MM. Fuchs and Langenbeck, at Göttingen, who supposed that they proved the existence of *mucores*, not only in the crusts of true Tinea *(Porrigo favosa* and *P. lupinosa)*, but also in the majority of eruptions belonging to what they term cutaneous scrofula, for instance, in the crusts of *Impetigo scrofulosa*, and in those of serpiginous ulcers. These researches are published by M. Fuchs, in his Compte Rendu the Polyclinique of Göttingen, in the *Ann. Hanov.* de M. Holscher, Cahier de 1840, and still later in the first volume of his *Traité des maladies de la peau*, Göttingen, 1840.

Latterly, however, a much fuller and more correct description of this disease has been given by M. Gruby, of Vienna,§ who states that the crusts of Tinea favosa contain, or in fact are made up of aggregated *Mycodermata*. This growth consists of numerous corpuscles, rounded or oblong, the longitudinal diameter of which is from about the $\frac{1}{300}$th to the $\frac{1}{100}$th of a millim, and the transverse from the $\frac{1}{300}$th to the $\frac{1}{150}$th. They are transparent, with a defined border, and smooth surface; colourless, or slightly yellow, and homogeneous. The corpuscles are either separate, or, by their apposition end to end, constitute beaded or articulated filaments, which are simply cylindrical or branched, according to the part of the crust in which they are found. Besides these beaded filaments, other much smaller branched filaments are to be observed, which are furnished at certain distances with partitions (cloisons vegetales), and thus represent oblong cells, in which are found very minute round, transparent molecules, as exhibited by the figures in the accompanying plate. Occasionally, some granules are found ad-

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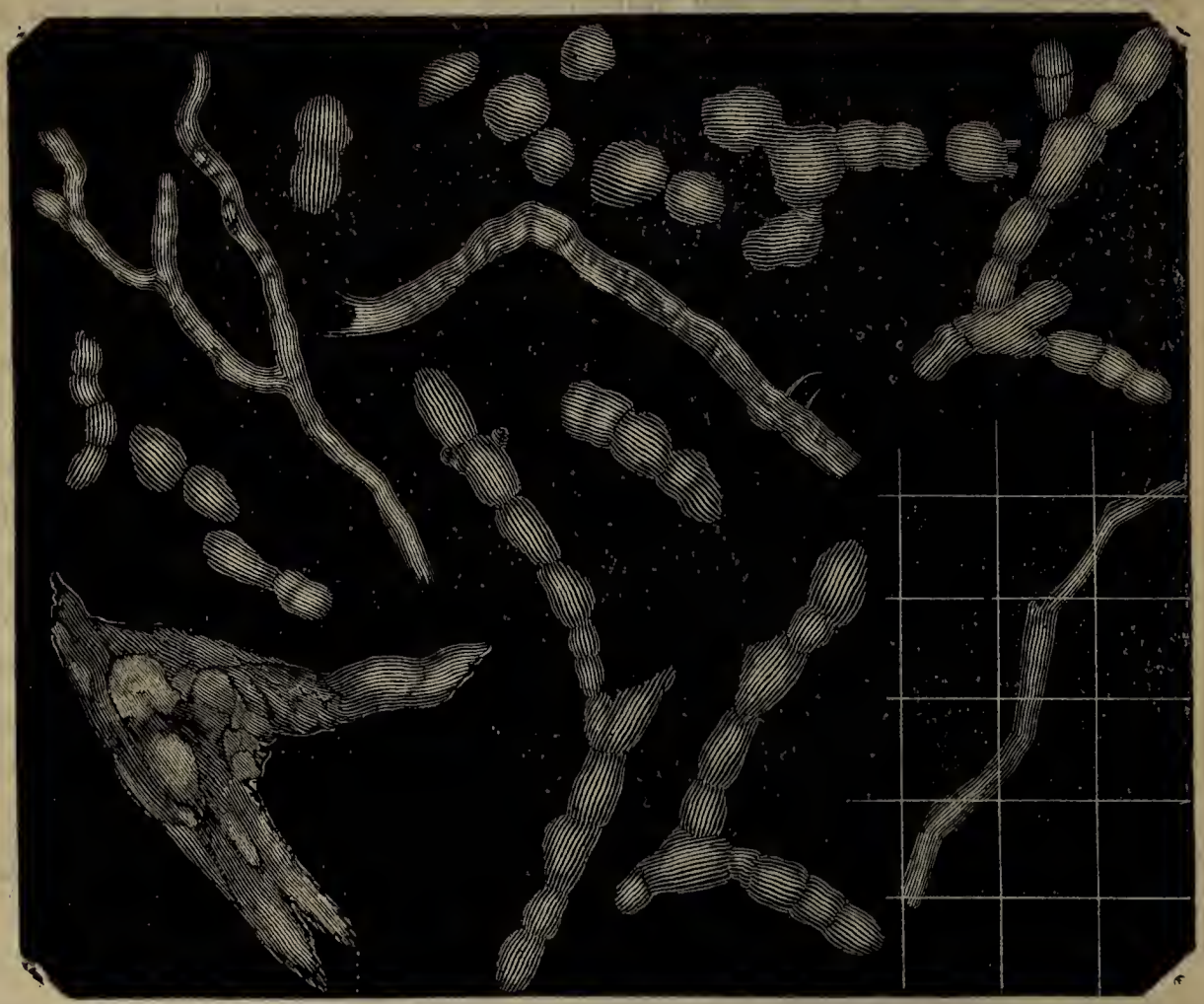
* Müller's Archives. † Medicinisch. Zeitung, No. XVI, Page 73, 74.

‡ Valentin's Repertorium, 1841. § Comptes Rendus, 1841.

herent to these filaments, similar to the spores of *Torula olivacea*, and *T. sacchari*.* The form of these filaments, is considered by M.



Portion of Epidermis. Scale $\frac{1}{8000}$ of an inch each.

Gruby a sufficient proof of their vegetable character, and according to M. Brogniart they belong to the group of *Mycodermata*.

Each crust of Tinea is described by M. Gruby to consist of two envelopes, formed by the cuticle, and an aggregation of Mycodermata, which are enclosed within them *like fruit in their pericarps*. The crusts are placed on the *surface* of the true skin, and the *Mycodermata* are developed among the cells of the epidermis.

The external disc of the capsule, which at the commencement is not perforated, becomes open in the centre by a small hole, whose borders are elevated, by the continual development of the Mycodermata. This opening enlarges by degrees, and there is thus formed in the centre a

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* Icones fungorum hucusque cognitorum. A. C. J. Corda, Pragæ, 1837, 1840.

[The above figures, copied from the drawings of Mr. G. Busk, are engraved on copper, by Mr. J. Shury, Jun., of 13, Charterhouse Street. We were desirous of giving the process a trial, as it appeared to us peculiarly applicable to the illustration of such structural subjects. Here is the result; we leave our readers to form their own opinions as to its merits or demerits.—*Editor*.]

whitish excavation, whilst the borders remain of a yellowish colour. Simultaneously with the enlargement of the opening, the Mycodermata protrude, and are developed like a fungus, and finally the borders disappear; the stems of the Mycodermata are prolonged, and the sporules shoot out vigorously, more in the centre than at the periphery. From this mode of growth, the form of the crust becomes quite altered, it being, when completely developed, convex, instead of concave on the outer surface.

M. Gruby practised inoculation with the contents of these crusts upon thirty Phanerogamous plants (but succeeded only once); on twenty-four silk-worms; four birds; eight mammals; and six reptiles, without any result. Similar inoculation in the arm of himself four times, and of another individual once, was followed also by no result, except in one instance, when a little inflammation ensued. Consequently, out of seventy-seven inoculations, one successful result only was obtained, and that on a Phanerogamous plant; a strange fact, as is truly observed by M. Gruby.

At pages 24 and 139 of this Journal will be found notices of various other observations of parasitical growths on animal bodies; but these my limits will not allow me farther to detail. In the present number, (p. 155) also, is an account of similar vegetation on the ova of fishes, to which it proves highly destructive.

On the 1st of March 1841, Mr. Westwood exhibited at the Entomological Society, dried specimens of Chinese larvæ, from the back of the neck of each of which a slender Fungus, twice as large as the body of the insect, had been produced. The vegetation was stated to be analogous to some on larvæ from New Zealand, and is named *Clavaria Entomorhiza*.* M. Corda gives the figure of a Coleopterous insect† covered with *Penicillium Fieberi;* and a similar instance of the growth of a minute Conferva upon the body of a *Dytiscus marginalis*, occurred a short time since to my observation. This insect was kept in a glass vessel, in which were growing some plants of Valisneria spiralis, the leaves of which were much infested with the Conferva. The beetle was killed, apparently by the growth of the Conferva among the branched hairs, with which its spiracula are furnished internally.‡ (Pl. I. Fig. 1.)

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* Annals of Natural History for November 1841.

† Pentatoma prasina, Op. cit. Pl. xi.

‡ [We are informed by Mr. J. T. Cooper, that he has frequently removed from the gills of gold fish, kept in a cistern in his garden, a quantity of Confervæ, the rapid growth of which over the whole surface of their bodies, in every instance caused death.—*Editor.*]

These are the principal facts which I have been able to collect on this subject; for it is scarcely worth while to refer to the vague speculations of M. Meynier of Orleans, whose assertion of the analogy of warts and similar growths, with Fungi of the order Gymnospermia; of Lepra and Psoriasis with Lichens and Mosses; and of pulmonary tubercle with Lycoperdon, may, I think, justly be considered more the fruit of a heated imagination than of sure observation. The *Mucores* observed by Langenbeck in the body of a person dead of typhus, had certainly no connection with that disease; and, as for the opinion, that hospital gangrene is dependent on the presence of a fungoid growth, I am unable to refer to the authority, upon which such a doubtful statement is founded.

The above briefly recited facts are far too few in number, and not sufficiently precise, to allow of any general deductions of importance to be drawn from them; but it appears clear,

1.—That parasitical growths occur in nearly all classes of the animal kingdom.

2. That these growths arise usually on the surfaces of animal organs, and are sometimes prolonged thence into the textures of the part.

3. That they have in several instances been ascertained to constitute the cause of disease and death; and that the disease thus produced has been found in some cases to be contagious.

4. That they are probably of two kinds, the one peculiar to animal bodies, and the other consisting of these Cryptogamic vegetations, which readily sprout up under favourable circumstances, on almost any inanimate substance.

To the former kind may be referred the *Muscardine* of the silk-worm and *Mycoderm* of Tinea; and to the latter, most of the other growths above alluded to.*

The vegetable nature of these growths does not in all cases appear so clear as might be supposed. In some of the instances cited above, there can be no doubt on the matter; but in others, and especially that of the *Mycoderm*, constituting the crusts of Tinea, it is allowable to doubt whether the growth may not be more properly referred to the animal kingdom. In fact, it would appear, from the chemical consti-

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* With the exception of the Parroquet, whose case is related by M. Rousseau and M. Serrurier, in which, in the account given by these observers, the seat of the parasitic growth is by no means clearly defined, it would appear that these parasitic growths have nearly all had some relation to the air passages, and in this point of view it is interesting to refer to the account of *Chrysomyza Abietis*, at p. 155 of this Journal.

tuents of these crusts, impossible to hesitate in ascribing their contents to that division of animated nature; for according to the analysis of Thenard, they contain

70 Albumen.
17 Gelatine.
5 Phosphate of lime.
8 Water and loss.

100

a composition certainly more animal than vegetable. With regard to this, also, it is interesting to refer to the paper of M. J. B. Desmazieres,* in which the genus *Mycoderma*, founded by Persoon in 1822, is for the first time accurately described and figured. He describes five species occurring in various vegetable infusions. The marked similarity of the figures of some of these species, with the Mycoderm of Tinea, is sufficiently curious, viz. those of *M. glutinis farinulæ* and *M. cerevisiæ*, or those occurring in flour-paste or sour beer (Pl. I, fig. 2). M. D., whose paper is well worthy of perusal, considers, from his having observed the globules of the Mycodermata occasionally in active motion, that they are of animal nature, and gives the following definition of the *genus*: —Mycoderma.—*Desmaz. Ann. Sc. Nat. Tom. X. 1e Ser. p. 59.*—"Animalcula monadina simplicissima, hyalina, gelatinosa, minutissima, prædita locomobilitate plusminusve manifestâ; inter se ab uno extremo ad alterius extremum ordine longo cohærentia, sive in statu primordiali, sive post elongationem plus minusve notabilem; efformantia hâc adjunctione fila inertia, hyalina, creberrima, ramosa, moniliformia, vel dissepimentis conspicua, fere semper incumbentia liquoribus, vel substantiis humidis in quibus nascuntur et ubi, per eorum implicationem, constituunt pelliculam plus minusve spissam. Generatio per gemmas interiores."

The resemblance in figure, however, of this parasite to various growths, in all probability vegetable, is equally striking, if we do not consider that all growths composed of distinct rounded cells, whether of animal or vegetable nature, will necessarily much resemble each other. For instances of this resemblance, it is only necessary to refer generally to the plates in M. Corda's work,† and particularly to the figures of Gonatorhodon speciosa; the extreme filaments of Stysanus

* "Recherches Microscopiques et Physiologiques sur le genus Mycoderme."—Annales des Sciences Naturelles, Tom. X. 1e. Ser. 1826.

† Pracht-Flora Europæischer Schimmelbildungen, Leipzig, 1839.

Caput Medusæ; Torula Tritici; Torula olivacea; Torula frutigena; and several others.

The description of the Mycoderm of Tinea, by M. Gruby, above referred to, so accurately corresponds with the observations I have myself been enabled to make very lately, that I have thought the addition of a few figures of the appearance presented by this parasitic growth under the microscope (see Figures, p. 148), would be sufficient to prove the truth of the position, that the disease does in reality consist of such a growth, and that this growth corresponds in every respect with the characters of Persoon's genus, Mycoderma. I have not, however, been able to perceive any movement in the globules themselves, as appears by M. Desmazieres' observations, to have been the case in other species of this genus. There is, however, always to be observed in the fluid with which the Mycodermata may be mixed, a great number of actively moving molecules or minute Infusoria.

This Mycoderm is readily seen by placing a fragment of a crust of *Porrigo*, moistened with water, between two glasses. The younger crusts present many of the small branched filaments and separate corpuscles; the larger crusts contain more of the beaded filaments, and in all, *the Mycodermata are found mixed with epidermis scales.*

XXXII.—AN ABSTRACT OF THE "INFUSIONSTHIERCHEN" OF EHRENBERG.—No. 4.

By W. Hughes Willshire, M.D., M.B.S., Physician to the Fore Street Dispensary, &c.

Genus—Doxococcus.

Eye, projecting lip, and tail not present; position of oral aperture varying with respect to the direction towards which the animalcule is swimming; motion *rolling*, similar to the clusters of Uvella; spontaneous self-division simple, perfect, or none. In other respects they resemble the *Monades*.

Four species are known: one is of a brick-red colour, another of an obscure green, a third whitish with green spots, and the fourth is colourless.

Genus—Chilomonas.

Eye and tail not present; projecting lip present; mouth lateral or oblique, provided with cilia (?) or with a very delicate filiform proboscis (double ?); spontaneous self-division perfect, or none.

The members of this genus are well characterised by the oblique position of the oral aperture with respect to the longitudinal axis of the body, and by the presence of the protuberant lip. The creatures move in the direction of the longitudinal axis of the body.

Three species are known : two are devoid of colour, and the remaining one is of a pale yellow hue.

Genus—Bodo.

Eye and projecting lip not present; tail present; mouth terminal; spontaneous self-division simple, perfect, and bipartite, or none.

The presence of a caudal appendage sufficiently characterises the species of the present *genus*. It may be remarked, however, that the solitary individuals sometimes cluster voluntarily, forming mulberry or grape-like masses.

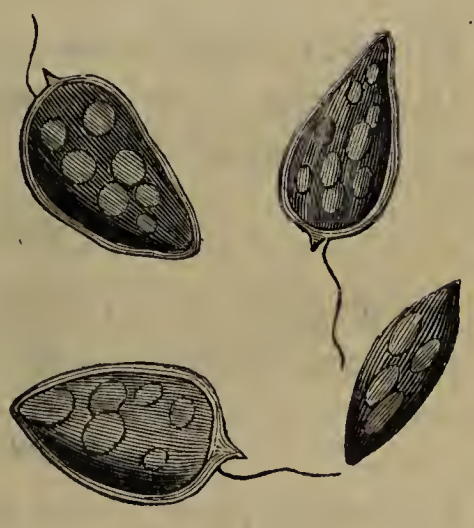
Eight species are known: one is of a green colour, the rest are colourless.

Bodo socialis is one of the Infusoria most frequently met with in stagnant spring water, and vegetable infusions. Three other species are parasites.

FAMILY II.—*CRYPTOMONADINA.*

Polygastric animalcules provided with a hard or soft lorica, and in other respects possessing all the characters of Monadina, or, at least, not possessing any of the characters of other tribes of Infusoria : spontaneous self-division simple, perfect, or none.

All self-moving, free, and minute microscopic organisms, possessing the characters of the tribe Monadina, or not presenting those of any other family, and not enclosed in a general or common envelope, but in consequence of their self-division being perfect, or absent altogether, are free and solitary, and separately enclosed in a special gelatinous, membraneous, or hardened lorica, belong to the family Cryptomonadina.



Prorocentrum.

The following is a Synoptical Table of the Genera :—

- Organ of sight not present
  - Lorica obtuse and smooth
    - Form short; self-division longitudinal or wanting — CRYPTOMONAS.
    - Form elongated, tortuous; self-division transverse — OPHIDOMONAS.
  - Lorica acuminated anteriorly — PROROCENTRUM.
- Organ of sight present
  - Lorica, with a neck or narrowed orifice — LAGENELLA.
  - Lorica without a neck or narrowed orifice
    - Lorica an open shield, or *scutellate* — CRYPTOGLENA.
    - Lorica a closed case, or *urceolate* — TRACHELOMONAS.

Genus—CRYPTOMONAS.

Eye not present; anterior extremity obtuse; form short, not filiform or elongated; spontaneous self-division longitudinal, or none.

The species of this genus are like those of CHILOMONAS; but the latter are destitute of a lorica.

Seven species are known: five are of a green colour, the remaining one is brown.

Genus—OPHIDOMONAS.

Eye not present; lorica obtuse glabrous; form elongated, or filiform; spontaneous self-division transverse.

One species is alone described: this is of a brown colour.

Genus—PROROCENTRUM.

Eye not present; lorica glabrous, terminating anteriorly in a point.

One species is known: this is of a yellow, waxy hue, and is one of the phosphorescent Infusoria met with in luminous sea-water.

Genus—LAGENELLA.

Eye present; lorica rostrate, or with a neck, or narrowed orifice.

One species is known: this is of a beautiful green colour.

Genus—CRYPTOGLENA.

Eye present; lorica open like a buckler, and rolled in at the edges (scutellate); not rostrate or necked.

Three species are known: these are of a green colour. One is found in water when of a temperature near the freezing point.

Genus—TRACHELOMONAS.

Eye present; lorica a closed case, or urceolate, not rostrate, or provided with a neck.

Three species are known: two are of a green, one of a dark brown colour.

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

Unger on Chrysomyza Abietis.—Under the name of *Chrysomyza Abietis* is described by Unger, in F. J. F. Meyen's Jahresbericht, &c., for 1839, a peculiar exanthem of the Fir. He states, that the leaves assume a yellowish red colour, owing to the presence of prominent, linear, rusty brown spots, without being themselves otherwise swollen. The yellow colour is more or less diffused on the upper side of the leaf; but on the under side, besides this diffused colour, there are found one or more rusty brown spots, placed in a double row on the sides of the projecting leaf-veins. The situation of these spots corresponds, nearly always, with that of the Stomata. In the young state they are more opaque, and become when older more transparent, and more defined. The degeneration consists in a multitude of elongated vesicles, which are confined in a mucoid matrix containing granules, sometimes coloured, and sometimes colourless. This matrix forms an outer covering to the vesicles, and gives them occasionally a varicose appearance. They contain a yellowish grumous matter. The colour is not dissipated by boiling in alcohol. The disease commences in the stomata, which, in place of the air, contain a granular, mucous, at first uncoloured substance, which rapidly increases, becomes coloured in parts, and flocculent particles are formed in it. The vesicles appear, and it finally bursts through the cuticle. The course of the complete development of the disease lasts above a year.—*Abridged, p.* 92.

Valentin on Achyla prolifera.—With reference to *Achyla prolifera*, Valentin remarks, that this mouldiness, or colourless Conferva, very often recurs under favourable circumstances in animals. When occurring on the ova of fishes, it constitutes a very powerful preventive to their development, and its progress is so rapid that a single egg infected with it, will in a very short time infest many hundreds, and thus destroy them. He has ascertained, also, the same thing with regard to the ova of *Alytes obstetricans*. Its action upon the eggs of mollusca appears to be slower, which has been already remarked by Laurent.—*(Rep. V, p.* 44.*)* Valentin observed it, at all events, in a state of active growth for several days upon the ova of (probably) *Limnæus stagnalis*, during which period the embryo was in lively motion, and which did not die till later. In fishes, also, as the *Cyprinus nasus*, when kept in narrow vessels, and the water not quite sweet, he observed the same fun-

gus on all parts which might be abraded, as, for instance, the head and the tail.—*p.* 58.

[From the *Comptes Rendus*, 1841.]

*On a new Process for Anatomical Injections.**—M. Doyere, in a letter addressed to the Academy of Sciences, Paris, July 12, 1841, gives the following account :—I have employed for nearly two years, a very simple process for obtaining fine injections. This process, which I believe likely to render some service to the anatomy of structure, and probably also to pathological anatomy, essentially consists in causing to enter in the same vessels, *within a certain interval of time*, two finely filtered saline solutions, which, by double decomposition, give an abundant and opaque precipitate. This succession of two injections, is that which distinguishes my process from many others tried without success to obtain the injection of the capillary system by the same principle. I inject the second solution, as soon as the first has passed from the arterial system into the venous and lymphatic systems.

I have tried on animals a great number of insoluble salts, with a view to determine those which would give the most satisfactory results. I prefer to all others the chromate of lead. I first inject the chromate of potass, and am convinced that the order of injection is a point not to be neglected. A blue colour may be obtained by the precipitation of Prussian blue ; brilliant red by iodide of mercury ; white by the carbonate or sulphate of lead. The first has better succeeded with me than the carbonates and sulphates of lime and baryta.

The advantages which this process appears to me to possess over those in use, are above all to shorten the process of making fine injections, and to supersede any other preparation. It may be used with equal advantage cold or hot, in general or partial injection ; the materials employed are unalterable, and may be consequently always ready. I will add, that the most minute injections required only a pressure which was evidently less than that of the heart's action. M. Poiseuille, to whom I made the process known several months since, in order that he might make use of it in his particular researches, has constructed an instrument by the assistance of which he can inject either liquid with that degree of pressure he considers proper.

By the assistance of this process, I have more than once succeeded injecting by the femoral artery in a single operation, and in a few minutes, the capillaries of the muscular system in an entire animal, the adipose and cellular systems of the white and grey matter of the

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* Although the priority of discovering this process, and publishing the same, are decidedly due to M. Doyere, yet we must here state, that we have for upwards of twelve months seen injections of the corpuscles and Haversian canals in bone, the tubes on the fibre of some sponges, &c., similarly prepared by our esteemed correspondent Mr. George Busk, Surgeon to the Hospital Ship, Dreadnought. We can vouch for his not being acquainted with M. Doyere's process, the account of which bears date July 12, 1841.—*Editor.*

brain, of the conjunctiva, of all mucous membranes, intestinal villosities, &c. The capillaries thus injected by the chromate of lead are more filled, especially after drying, than by the injections of size, but less than by those of varnish (vernis); there also remains some doubt in my mind relative to the actual diameter of the latter canals. Those which run parallel to each primitive muscular fasciculus, to the number of four or six, appeared to me to possess, in the dog, $\frac{1}{300}$th or $\frac{1}{400}$th of a millimetre; but it is possible that their dimensions had been reduced by the action of one or the other of the two solutions employed, or that they had not been sufficiently filled. I am now engaged in determining the relation which exists between the size of injected vessels, and their size during life.

Bowman on the Contraction of Voluntary Muscles.—At the sitting of the Academy of Sciences, 27th September, 1841, Mr. J. E. Bowman, Demonstrator of Anatomy, King's College, London, stated, that he had sufficiently proved, that contraction never takes place in the whole length of a primitive fasciculus at the same instant, but that even the most violent contraction consists of partial contractions, which change their place with an inconceivable quickness.

Researches on the Reddening of Waters, and their Oxygenation by Animalcules and Algæ.—MM. C. and A. Morren are of opinion that the oxygen of the air in water varies in quantity at different hours of the day. For example: in very sultry (insolation) days, the quantity of oxygen in the morning is 24 parts in 100; at mid-day, 48 parts in 100; and at five o'clock, from 60 to even 61 parts in 100. This effect is in relation with the respiration of animalcules, and aquatic Algæ. Among the bodies which produce this effect, there is an animalcule which the authors have made their particular study, and to which the name of *Discerea purpurea* has been given. It is one of a number which colour water red. The same authors have further examined the phenomenon attendant on the red colour of waters, and have enumerated forty-two plants and animals which redden liquids. They have particularly noticed the *Monas vinosa* of Ehrenberg, the *Monas rosea*, the *Trachelemonas volvocina*, the *Euglena sanguinea*, the *Hæmatococcus*, and the *Tessararthra*, of which they have given monographs. According to these observers, the famed *Protococcus nivalis* of the snow is an animal.—30*th August*, 1841.

M. Soleil presented a Microscope of M. Donné, to which he had added an Adjusting Screw, rendering it much more handy and useful. —*July* 19, 1841.

Laurent on colouring Hydra.—He has succeeded in colouring the Hydra blue, white, and red, by feeding them with indigo, chalk, or carmine; but he remarked that the eggs did not partake of the colouring, although the parent acquired a very vivid tint.—*Guerin's Rev. Zool., June* 1841, *p.* 204.

Turpin on the Acarus of Pears.—Under the epidermis of the fruit of

some pears, Turpin once found a great number of the genus *Acarus*, of an oval shape, furnished with claws close to the beak, and four posterior filaments, presenting nothing very remarkable except four articulated legs, terminated by a single slightly-arched nail. The young individuals, after molting, assume their eight legs.—*Mem. de l'Acad. Instit. Paris*, 1840, *p.* 56.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

October 20th, 1841.—*Prof. R. Owen, F.R.S., &c., President, in the Chair.*

Mr. Thompson, of Belfast, forwarded some Fossil Infusoria from earth, obtained at Cork.

Mr. J. Quekett read a paper "On the minute structure of Bat's Hair." After alluding to the views entertained by Hunter, Mandl, Busk, and others, as to the formation and mode of growth of hairs generally, the author stated that his attention was directed to those of the bat tribe, in consequence of having on more than one occasion used a knife to separate them from the skin; on subsequent examination it was seen that the curious markings on their surfaces, which render these hairs so interesting, were destroyed in some parts, but were still present in others. By repeating the scraping process, it was found that minute scale-like bodies were detached, which were not unlike in shape the scales on the wing of a butterfly, but were very much smaller, and presented no trace of striæ on their surfaces; it was on the arrangement of the scales, and on their being more prominent in some species than in others, that the beautiful appearance of bat's hair depended. The scales might be procured either by scraping the hair with a knife, in a direction from the apex towards the root, or more easily by pressing them between glasses previously moistened by the breath. Many of them appeared to terminate in a quill, like that observed on the butterfly's scale; some few were flat, whilst others were curved so as to fit the shaft of the hair, and presented a serrated edge. The scales were absent near the bulb, but abounded in all parts of the shaft situated above the skin; and when removed from many of the larger hairs, the fibrous nature of the shaft, and its cellular interior were well displayed. Mr. Quekett spoke of the hair of an Indian bat, of which a small portion had been given him by Mr. Powell, in which, without any preparation, the scales could be beautifully seen, both detached and still adherent to the shaft; and he was led, from repeated observation, to consider a bat's hair as composed of a shaft invested with scales, which are developed to a greater or less degree, and vary in the mode of their arrangement in the different species of these animals; and concluded by stating, that bats resembled quadrupeds principally in their mode of reproduction, and birds in their mode of progression, but resembled both in the structure of their hair.

Mr. Bowerbank called the attention of the meeting to a source of fallacy he had detected in using strong solutions of salt and water, for

the preparation and preservation of animal tissues for microscopic purposes. He stated that he had recently been much occupied with observing the animal of the stony corals, which is exceedingly simple in its structure; and that he had observed numerous fasciculi, or networks of apparently small vessels in its structure, which had led him at first sight to arrive at conclusions as regards their formation. By accident he found that this network of apparent minute vessels, was due to the development of a *Confervoid* vegetable in the brine, of extreme delicacy.

Some discussion ensued on this subject, in which Mr. Owen and Mr. D. Cooper took part.

Mr. George Busk exhibited, after the meeting, a species of the genus *Acarus*, obtained from a pustule on a sailor's leg, which appeared to be a new species. The disease was contracted at Sierra Leone, by wearing the shoes of a West Indian. The matter was referred for further investigation.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

October 7th, 1841.—*Sir Henry Marsh in the Chair.*

The minutes of the last meeting having been read,

Mr. Bergin moved, and Mr. Callwell seconded, that the first Thursday in November be considered the Anniversary of this Society; when a report from the Secretary of the proceedings of the year, and from the Treasurer as to the funds, shall be presented, and the officers for the ensuing year be elected. Agreed to.

Mr. Yeates presented the description of his Modified Compressor, an account of which will be given in a future number.

Mr. Moore presented a species of Alga, which he believes to be undescribed.

Mr. Ball exhibited some portions of mud, lining the valves of a dead specimen of *Cytheræa Chione*, taken up at Plymouth, July 1841, which contained a number of remarkable forms, accompanied by rough sketches of them.

The Right Honourable the Bishop of Meath was proposed by Sir H. Marsh, seconded by Dr. Croker, and admitted a member of the Society.

Notes on the Plants (?) exhibited at the meeting of the Microscopical Society of Dublin, on Thursday, 7th October, 1841, by Mr. D. Moore, were then read.

Polysiphonia fibrillosa (?) if not, new to our marine Flora. The microscope showed the ultimate ramuli of this beautiful species, beset with fibrillæ in a remarkable degree; the main filaments many-striated, and both kinds of fructification perfect. The specimens, which were collected at Malahide, are much smaller in all their parts than English specimens of *P. fibrillosa*, and further disagree in general appearance from them.

Gomphonema ampullacea. Greville. — This singular substance has twice occurred to Mr. Moore in great abundance; once in the North, and again in the West of Ireland. It appears to be in perfection from July to September.

Gomphonema paradoxa. Greville. — Frequent on the Irish coasts.

Isthmia obliquata (Diatoma obliquetum, *Lyngbye*). This beautiful object occurs abundantly in one or two places in the North of Ireland, but is very local. It is in perfection in July and August.

Fragilaria pertinalis. Lyngbye. — Collected in the county Westmeath, on Belvidere Lake, adhering to aquatic grasses in August.

Licmophora flabellata. Agardh. — This, when well displayed, is one of the most beautiful microscopic objects in the whole order of Algæ (Agardh), or Infusoria (Ehrenberg).

Diatoma fasciculatum. Agardh. — Frequent on the Irish coast: attached to other Algæ.

Microscopical Memoranda.

Topping's Objects illustrative of the Process of Felting.—We have recently received from Mr. C. M. Topping (whom we had occasion to recommend to the attention of microscopists at page 16 of our Journal) a set of *twelve slides*, containing the hairs of various animals, the fur or wool of which is used for felting. The objects are numbered according to their tendency to felt, and, independent of their being generally interesting as objects of structural beauty, they are the more so to those particularly interested in the subject as a branch of manufacture. We recommend the set to all classes of observers.

We observe that Mr. Topping uses strips of mahogany veneer, (instead of slips of glass) with a hole bored through the centre for the glass to fix the object upon. This is a decided improvement over the old plan.—*Editor.*

Organic Beings in Mineral Waters.—Dr. Lankaster communicated some additional observations on the existence of organic beings in mineral waters (*Athen.* No. 674). He had found the *Conferva nivea* of Dillwyn in the sulphur spring on the Water of Leith, near Edinburgh. He had also found it in the wells of Moffat in Dumfriesshire, Gillesland in Northumberland, and Middleton and Croft in Yorkshire. At Moffat he found great quantities of the substance called *glairine*, and was convinced of its organic nature. At Moffat also he found a pink deposit in the drains outside the wells, and, on submitting it to the action of the microscope. he found that it was produced by an animalcule, but much smaller in size than those which produced the coloured sediments of Harrowgate and Askern. It had the characters of a Monas, and was not more than $\frac{1}{15000}$ of an inch in diameter.—*Athenæum, Aug.* 7, 1841.

Insects voided with Urine.—The specimens kindly forwarded us by Dr. R. S. Hopper, of Leeds, which are stated to have escaped in large quantities *per urethram* from a female, appear to belong to the larva of a Dipterous insect of the genus *Stratiomis* (Westw. Classif. Vol. II, p. 551). The specimens are referred for further investigation.—*Editor.*

XXXIII.—DESCRIPTIONS OF THREE SPECIES OF SPONGE, CONTAINING SOME NEW FORMS OF ORGANIZATION.*

By J. S. Bowerbank, Esq., F.G.S.

The first specimen described in this communication, was a *Halichondria*, which the author has named *H. Johnstoniana*, in honour of Dr. Johnston of Berwick-upon-Tweed. The sponge is sessile, massive, and has a smooth encrusted surface, of a dark iron-grey colour; the interior is of a dull yellow colour, and much resembles the crumb of bread. This sponge is remarkable for the great variety in the forms of the silicious spicula, of which the author described three distinct kinds, each of which is characteristic of a separate part of the animal:—1st. Those of the skeleton, which are mostly simple and slightly curved, having hemispherical terminations; they are occasionally tri-radiate or multi-radiate, and frequently branched. 2nd. Those of the interstitial fleshy matter of the sponge; these are minute stellate bodies, having their rays attenuating regularly to their apices, the number of the rays varying from three to ten or twelve. 3rd. The spicula of the crust or surface of the sponge; they are very minute and somewhat fusiform, terminate abruptly, and have their surfaces regularly tuberculated. The author also described a fine vascular tissue, which he observed on the surface of the great excurrent canals. The gemmules are oval bodies, having a silicious crust, which is filled with minute spicula. This species was found attached to the Thatcher Rock, near Torquay, Devonshire.

The second sponge described belonged to the new genus *Duseideia*, proposed to be established by Dr. Johnston in his "History of British Sponges."

This species was sent from Sydney, Australia, by Rupert Kirk, Esq., after whom it is named, *D. Kirkii*. It is sessile, massive, and somewhat compressed. The skeleton is coarsely fibrous, and coralloid in appearance, having numerous *grains of sand* separately imbedded *in its substance*. The grains are not imbedded in the fibre from pressure through the external surface, but they occupy its very centre; each grain being separately encrusted by the cartilaginous matter of the skeleton, and the whole being surrounded by a thick coating of the same substance. The author described at length the mode in which this

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* Abstract of a paper read at the Microscopical Society of London, Nov. 24th, 1841. Communicated by the Author.

curious structure appears to have been built up, and illustrated his descriptions by highly magnified drawings of the manner in which the grains are arranged in the fibrous skeleton. Spicula were of rare occurrence in this specimen; when observed, they were embedded in the external coating of the cartilaginous fibres; they are short, and comparatively thick in proportion to their length, decreasing very slightly from the middle to near the points, and are terminated acutely, but somewhat abruptly.

The third species is the *Spongia fragilis* of Montagu, or *Duseideia fragilis* of Dr. Johnston's manuscript.

It is massive, variable in form, of a dull ochreous yellow colour, and has the surface asperated by the projection of fibres, which contain numerous grains of sand, embedded in a manner similar to those described in treating of the last species. There are also other fibres, which are tubular in their structure, containing few or no grains of sand, but an abundance of spicula, remarkable for their great variety in form and size. No spicula were found in the fleshy matter of the sponge, but a considerable number of round or oval bodies were observed, which presented every appearance of being cytoblasts.

The author concluded his paper by some observations on the present state of our knowledge of the structure of the *Spongiadæ*, and noticed certain changes that will become necessary in their systematical arrangement, when our information regarding their structure is more matured.

Drawings of the species described, and the various forms of spicula contained in their structures, illustrated the paper.

XXXIV.—OBSERVATIONS UPON THE IMPORTANT PART WHICH MICROSCOPIC ORGANISMS PLAY IN THE CHOKING UP OF THE HARBOURS OF WISMAR AND PILLAU; ALSO IN THE FORMATION OF THE MUD WHICH IS DEPOSITED IN THE BED OF THE ELBE, AT CUXHAVEN, AND UPON THE AGENCY OF SIMILAR PHENOMENA IN THE FORMATION OF THE BED OF THE NILE, AT DONGOLA, IN NUBIA, AND IN THE DELTA OF EGYPT.*

By M. Ehrenberg.

During the course of the year 1839, M. Ehrenberg made special researches upon the form of the mud-banks in the harbour of Wismar in

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* Report of a memoir read to the Berlin Academy of Sciences, in March 1841, extracted from Professor Jameson's Edinb. New Phil. Journ., Oct. 1841, p. 386.

the Baltic, and arrived at the following result, which he communicated to the *Societé des Amis des Sciences Naturelles*, on the 18th of February, 1840; namely, that from $\frac{1}{20}$th to $\frac{1}{4}$th of the mass of deposited mud consisted partly of living Infusoria, and partly of the empty shells of siliciously enveloped and dead Infusoria. Last year, 1840, he repeated these researches, and obtained a precisely similar result.

In the harbour of Wismar, according to the documents which were officially communicated by M. Rose, it appears that every week 36 lasts of this mud are deposited, every last weighing 6000 lbs.; so that it may be deduced, after seven and a half months of observation, that there is an annual deposit of 1080 lasts, or of 32,400 metrical cwts., or of 6480 cubic metres. For a century, and probably more, matters have proceeded in this way without interruption; so that during the last hundred years, there have been deposited by the running waters at Wismar, 108,000 lasts, equal to 3,240,000 cwts., or 648,000 cubic metres of this mud. Hence, then, supposing, which is very nearly correct, that $\frac{1}{10}$th of this mass consists of visible organic matter, there have been deposited at Wismar, during the last century, of these microscopic silicious organisms, 64,800 cubic metres, or annually 648 cubic metres, which, when dry, cannot constitute more than $\frac{1}{10}$th, and probably not more than $\frac{1}{40}$th, or even less of the total weight.

The results which have been obtained at Wismar in the year 1840, suggested the idea to M. Hagen, to make similar experiments upon the deposits at Pillau, and to communicate his observations. The specimens of the deposits which he transmitted to M. Ehrenberg, are still richer in organized beings than those of Wismar. They often constitute, according to the result of forty experiments made upon different samples, one-fourth, and sometimes even a half of the entire volume. Hence it will follow, that at Pillau, also, there are annually separated from the running waters, from 7200 to 14,000 cubic metres of pure microscopic organisms, which in the course of a century would supply, in this place alone, a deposit of from 720,000 to 1,140,000 cubic metres of Infusory-rock or Tripoli-stone.

Both at Wismar and Pillau there are to be met with in the organized materials, some forms which are entirely new, and others which belong to the waters of the ocean. As it regards the last-named harbour, which is in the channel called *Pillau-Haffe*, the north wind often causes the sea-water to flow into the river.

M. Ehrenberg also alludes to the researches he made concerning the muddy deposits of the river Elbe at Cuxhaven, and which were submitted to the attention of the Berlin Academy in the year 1839. These muddy

deposits also appeared to be composed, to the extent of nearly half their volume, partly of Infusoria with silicious heads, and partly of Polythalamia with calcareous heads.

To these observations M. Ehrenberg now adds the results of his recent observations upon the mud of the Nile, the deposit of which has, from the remotest period, attracted the attention of the curious. He has purposely compared with this mud, African deposits procured from Daebbe and Ambukohl, in Dongola: from Tangeur, in Nubia; from Thebes and Gyzeh, in Upper Egypt: from Boulak, near Cahira; and from Damietta, in Lower Egypt. He has also in his possession specimens of the ancient deposits of the Nile, which M. Parthey and Lieutenant-General Minutoli brought to Berlin. In all these specimens he has found that the Sponges, the Silicious Infusoria, and, especially from the neighbourhood of Damietta, the calcareous Polythalamia of the arable districts on the margin of the Nile, existed in such vast abundance, that without going the length of asserting that they absolutely predominate, still it is a fact, that there is not a particle of this soil of the size of half a pin's head in which, making no allowance for the chemical changes which may have taken place, there was not one, and frequently many of these animals.

We may now, therefore, safely affirm, that the deposits in harbours, and even the accumulation and the extraordinary fertility of the mud of the Nile, and probably of all other river deposits, proceed not solely from the gradual destruction and mechanical transport of one portion of solid soil to the formation of another, no more than they are solely the product of the vegetation of plants; but, on the contrary, that they result from the immensely rapid agency, hitherto scarcely recognized as vital, of animal organisms, which are undiscernible to the naked eye, but whose quantitative and natural limits must henceforward be inquired into, and which, from this time, must be considered as possessing a very important influence upon these natural phenomena.

XXXV.—AN ABSTRACT OF THE "INFUSIONSTHIERCHEN" OF EHRENBERG.—No. 5.

By W. Hughes Willshire, M.D., M.B.S., Physician to the Fore Street Dispensary, &c.

FAMILY III.—*VOLVOCINA.*

Polygastric animalcules having a uniform body destitute of true ap-

pendages or members, provided with an envelope or lorica, dividing by spontaneous self-division into numerous individuals within the extensile lorica, and hence assuming a polypoid appearance. Lorica at length bursting, and allowing the several animalcules to disperse when they have arrived at the due degree of maturity.

The following is a Synoptical Table of the Genera :—

- Organ of sight not present
  - Caudal appendage not present
    - Lorica single
      - Lorica roundish
        - Vibratile proboscis not present — GYGES.
        - Vibratile proboscis present — PANDORINA.
      - Lorica tabulated or compressed — GONIUM.
    - Lorica double — SYNCRYPTA.
  - Caudal appendage present — SYNURA.
- Organ of sight present
  - Self-division equal and perfect (forming no secondary polypoid masses)
    - Caudal appendage present — UROGLENA
    - Caudal appendage not present
      - Proboscis single — EUDORINA.
      - Proboscis double — CHLAMIDOMONAS.
  - Self-division unequal (forming secondary polypoid masses)
    - Proboscis single — SPHAEROSIRA.
    - Proboscis double — VOLVOX.

Genus—GYGES.

Eye and tail not present; lorica single, urceolate, subglobose; creature destitute of a vibratile filiform proboscis.

Only two species are described; the several creatures within the common envelope being of a green colour.

Genus—PANDORINA.

Eye and tail not present; lorica single, urceolate, subglobose; creature provided with a vibratile filiform proboscis. From the peculiar mode of self-division, the polypoid-like mass has somewhat the form of a mulberry.

Species two: one is green, the other colourless.

Genus—GONIUM.

Eye and tail not present; lorica single, developing by spontaneous self-division, in flattened, tabelliform, and square polypoid masses.

Five species are known: four have green animalcules within the transparent general lorica, the other is colourless.

Genus—SYNCRYPTA.

Eye and tail not present; lorica double—clustering Cryptomonades enclosed within a common envelope.

Only one species is described: this is of a green colour.

Genus—SYNURA.

Eye not present; tail present, attached to the base of the lorica or to the centre of the polypoid mass.

Species one: of a yellow colour.

Genus—UROGLENA.

Eye and tail present; division of corpuscles simple and uniform.

After self-division has taken place once within the general lorica, the creatures resulting from such division do not divide into secondary polypoid masses.

Species one: creatures of a yellowish colour, with a red eye.

Genus—EUDORINA.

Tail not present; eye and filiform proboscis present; division of corpuscles simple and uniform.

Species one: of a yellow colour, and has a red eye.

Genus—CHLAMIDOMONAS.

Tail not present; eye present; filiform proboscis, double; division of corpuscles simple and uniform.

Species one: corpuscles green, with a red eye.

Genus—SPHAEROSIRA.

Tail not present; eye present; filiform proboscis simple; division of corpuscles compound and unequal.

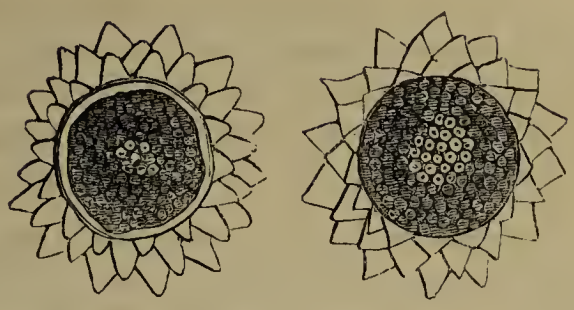
After general self-division has taken place within the common envelope, the creatures resulting from such division again divide, forming secondary clusters.

Species one: of a pale green colour; the eye is red.

Genus—Volvox.

Tail absent; eye present; filiform proboscis double; division of corpuscles compound and unequal.

Three species have been described: all of a green colour.



Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

*Swïbe upon the Development of Boletus destructor.**—It first appears, according to him, as a fugitive growth (auflug) of a dirty green colour, consisting of fine, simple, microscopical filaments, somewhat transparent, and covered with minute, round, greenish germ-globules, and in this respect resembles the *Dematium virescens* (Pers.) This fugitive growth is converted afterwards into fine cobweb-like threads, interwoven with thicker branched filaments of a yellowish colour. Under the microscope both sorts of filaments appear colourless, exceedingly transparent and curved. One portion of them lies closely together, and they become glued in their position by a yellow resinous substance. The yellow branched filaments become gradually thicker, and at last assume the form of a rhizoma, with a brownish rind and transparent in the centre. The fibres in the latter resemble the colourless one above described. Those of the rind are more slender, less transparent, of a dark brown colour, and interwoven. The outer extremities of the rhizoma-like body, consist of very fine filaments, which have some resemblance to *Oscillatoria punctata.* In spring and summer, and especially in a moist atmosphere, they become, as it were, woven into a dry silky texture, on which the germ powder is again formed, whence a new growth of the Fungus commences.—p. 81, 82.

Mohl on the Colouring of Vegetable Membranes by Iodine.—From the numerous experiments of Mohl, which are recorded in the Flora, a universal Botanical Journal by Hoppe and Fürnrohr, and of which an abstract, too long for our limits, is given in Valentin's Repertorium 1841, it would appear, that colours varying from brown to blue, may be produced in all vegetable membranes, when placed in a condition to absorb a large quantity of Iodine. A yellowish or brown colour is caused by the application of the Iodine in a state of vapour, and a violet or blue by very concentrated solutions. He further concludes, that the reception of Iodine, and consequently the colouring, is in proportion to the consistence of the membrane. The weaker and softer, and more absorbent membranes, being the more ready to assume the blue colour. Schleiden agrees with these statements, and concludes, as was already

* Schlechtendahl's Linnæa, p. 194—200.

proved by his own and Vögel's experiments upon Amyloid, that Iodine is not a special re-agent for starch only, and that generally the blue colouring has no connection with chemical combination. He, however, is not disposed to allow, that only the consistence of part of the membrane regulates the absorbing power.

Crystals and other Inorganic Deposits in Plants.—The greater number of the white points visible on the outer integument of the bulb of *Muscari comosum*, consist, according to Goeppert, of larger cells, which are aggregations of four-sided prismatic crystals, placed nearly parallel to each other, and pointed at both ends. Payer also (Froriep's Notizen. No. 335, p. 65-68), has examined a number of these deposits in plants; as, for instance, in the leaf-stalks of several species of *Ficus*, *Parietaria officinalis*, &c., *Urtica nivea*, and *Forskalea tenacissima*. Others more cylindrical, in *Celtis Australis*, and *C. Missisipiensis*, and those in the leaves of *Morus nigra*, *M. alba*, and *M. multicaulis*. They are found at the base of the hairs in *Broussonetia papyrifera*, and *Humulus Lupulus*, and *Cannabis sativa*, and are peculiarly remarkable in the leaves of *Conocephalus Naucleiflorus*. A single large leaf of the *Broussonetia papyrifera* contains 134,000 of these concretions. Carbonate of lime is frequently met with in these deposits, between the cells of the parenchyma of the leaves, or their ribs, in the ducts of the leaf-stalk and its base. It is present in these situations, even in leaves of so acid a juice, that this would necessarily dissolve the carbonate of lime, were they in contact. Oxalate of lime, which is usually distributed in the leaves of plants, appears, as in the stems of *Cactus*, in transparent aggregated crystals, in the form of spheroids covered with points, and enclosed in a membrane, and sometimes also as octahedral or octangular prisms. *Raphides* consist of an investing membrane filled with oxalate of lime. Silex incrusts many vegetable membranes, and is seen also in the shape of orbicular concretions.

*Link on the Structure of Coal.**—Link (Froriep's Notizen, No. 320, p. 117-81) has established from comparative microscopical researches, that the greater part of coal originates not from mineralized stems, but from the peat or turf of the ancient world.—p. 79.

References to recent Foreign Works on the lower Cryptogamia.—For foreign information about the lower Cryptogamia, we refer our readers to:—

Turpin.—Journal de l'Institut. No. 328, p. 126, "On the *Penicilliam Biottii*, a species of Mould which is formed in solutions of Dextrine."

Amidi.—Atti della prima ricenione degli scientziati Italiani tenuta in Pisa nell, Ottobre de 1839, Pisa, p. 157, "On the *Uredo Rosæ*."

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* We are informed by Mr. Robert Warrington, that from frequent observation of the extensive peat districts in Scotland and the north of England, he has long entertained the opinion, that the coal formation has originated from this source, which the investigations of M. Link fully confirm.—*Editor.*

Göppert.—Uebersicht der arbeiten, &c., der schlesischen gesellschaft &c. fur 1840, Breslau 1841, "On the structure of *Pisolithus arenarius*."

Körber.—Id. p. 95, 99, "Upon the relation of the *Gonidia* with the *Soredia* of lichens."

[From *Müller's Archives*, 1841.]

On the circulation in the Infusoria.—Dr. Erol of Munich, in a letter to Professor Müller, says, "I have now very often seen and shown to my friends about here a kind of circulation in the Infusoria, a phenomenon so remarkable that I cannot but wonder that it is not mentioned by any microscopic observer. I find it most distinctly in the *Bursaria vernalis*, whose abdomen, you know, appears to be quite full of green globules. Of these globules, those which lie near the periphery of the animal are incessantly moving, whether the animal itself be still or not, in an elliptic current upwards and downwards. In this current three or four globules always lie close by one another, and move together with the stream. It has no relation whatever to the vivid ciliary motion that is constantly going on at the outer surface."—*Heft.* 3, 1841.

On the Development of the Hair. By Dr. G. Simon of Berlin.—All the investigations into this subject, which are possessed of any real value, are comparatively recent. For most that is important, we are indebted to the researches of Heusinger, Gurlb, Henle, Mandl, Busk, and Bidder; but many points have been still left undetermined, to some of which Dr. Simon has directed his attention.

Heusinger has stated that a black discolouration of the skin precedes the formation of the hair. Simon found this substantiated by the appearance of the skin in the embryos of the pig, and ascertained, as Heusinger had done before him, that this colour is produced by small black granules, which lie very close together. In some embryos this was not perceptible, while in others part of the skin was white, part discoloured. This difference of colour was owing to the presence of white corpuscules in the place of the dark granules. These bodies are formed of small sacs, running from the epidermis in a very oblique direction into the corium, which begin with a narrow neck, and terminate in a rounded pouch. They are in hair follicles, and are formed a considerable time before any hair can be observed in them. The only difference between the white and the dark follicle is, that the walls of latter, in addition to being formed of a granular matter, are furnished with a layer of pigment cells.

At the bottom of the hair sacs of some embryos six inches long, a dark mass was seen, perfectly distinct from the lining of pigment, and closely resembling in form the root of the young hairs. This mass too, was observed in some sacs unfurnished with pigment cells, and was composed of rounded granules in close apposition with each other, and very similar to the pigment cells in the rete malpighii of the human skin. Another circumstance, too, which renders it extremely probable

that this is the root of the young hair, is, that in no follicle containing pigment cells, was the mere point of a hair ever found, but the young hair always appeared complete, though very small. In those sacs which were not lined with dark pigment cells, the hair had the appearance of terminating in very minute fibres, but this was without doubt owing to the transparency of the cells of which the root of the hair is composed. Henle and Bidder's opinion, that the hair is formed from the cells at the bottom of the hair sac, is very probable, but most likely, the nuclei of the cells undergo the transformation into the fibres of the hair, and not the cells themselves, as Bidder imagined.

After the hairs have acquired such a length as not to be capable of being contained in the sac, they become bent into loops in such a manner, that while the point and root of the hair are near each other, at the bottom of the sack, the top projects out of the cavity. This condition of the hair existed in embryos seven or eight inches long; in others from eight to twelve inches in length, the points of the hairs, and part of their shaft projected from the sac, but were covered by a membrane which invests the whole fœtus, and which was imagined by Isben to be a prolongation of the amnion. To this notion, notwithstanding some difficulties which oppose its adoption, Dr. Simon inclines.

In addition to the true sac, all the hairs of the embryo of the swine have a second investment contained within it, and analogous to that part which Henle termed the sheath of the root, in his description of human hair. This sheath is perceptible in hairs which are still entirely contained within the follicle, when it presents the appearance of a transparent line on either side of the hair. In no instance, however, were any traces of this sheath perceptible before the hair was formed. The sebaceous follicles connected with the hair sac, exist before the formation of the hair. They differ in structure from the sebaceous follicles in the full-grown pig, and consist of an elongated pouch, apparently divided into compartments by transverse lines, and occupying the upper part of the hair sac. One end of this pouch terminates close under the opening of the hair sac by a conical or elongated point, and its lower extremity is composed of an appendix of round granules bearing some resemblance to a bunch of grapes. When the hair follicle contains a young hair, this appendix is frequently divided by it into two lateral lobes, which project beyond the borders of the hair follicle on either side. Each of these lobes, which still retains the appearance of being composed of rounded granules, continues connected with the pouch, either immediately, or by means of a delicate prolongation, divided, like the pouch itself, into transverse compartments. Whether these sebaceous glands undergo subsequent metamorphoses, by which they are brought to resemble the condition of those parts in the adult animal, or whether new follicles are formed when the fœtal hairs drop out, and the bristles begin to be developed, has not yet been ascertained.

Dr. Simon confirms the opinion that a distinct cortical and medullary substance exists in the hair; though when the hairs are black, the cortical substance presents as dark a colour as the medullary matter. He instituted experiments on the human hair to disprove Mandl's recent

assertion, that the tips of the hair are capable of being more or less perfectly reproduced; and lastly, by examining the development of the hairs in the embryos of the dog and calf, he has ascertained that his observations on the pig hold good with reference to other animals.—*Heft.* 4. *Transl. in Lond. and Edin. Med. Journ.* 1841.

[From the *Annales des Sciences Naturelles*, 1841.]

Lallemand on detecting Spermatic Animalcules.—M. Lallemand enters at some length into the pathological conditions connected with the evolution of spermatic animalcules in man, and points out the mode by which they may be detected under a variety of circumstances, a few abstract notices of which we subjoin:—After every discharge of the fluid, there remains always sufficient in the urethra for microscopic examination, a single drop of which affords myriads of animalcules in active motion; and as the fluid evaporates from between the plates of glass, the addition of water of the temperature of the body, renders their movements more free. M. L. also finds that the animalcules are always found in a living state in the urethra, some time after the act of coition; and recommends that the first drop of urine should be collected on a piece of glass, in order to view them in the best manner, as the warmth and dilution of the secretion by the urine, favour much the rapidity of their motions. The fluid so obtained is frequently mixed with mucus, prostratic fluid, and portions of epithelium. This test has been found of considerable importance to the physician.

Out of thirty-three subjects which M. L. examined after death, he only met with two cases in which he could detect the spermatic animalcules in the gland; the one died subsequent to a fall on the previous day, and the other of acute gastro-enteritis.

The microscope affords a very ready method of determining the nature of secretions from the urethra, though they become dried on linen. If a spot be supposed to be that of semen, and if it contained at the time of its emission spermatic animalcules, by moistening the same with water they are found to regain their former or original state, even after some years, and to possess the aspect and odour characteristic of the secretion. They may also be detected in urine, when the semen is voided with that fluid; in such cases they are to be found at the bottom of the vessel in which their presence is supposed, and if any mucus be present, on the surface of that substance.

[Those of our readers who may be further interested in this subject, are referred to the original memoir of M. Lallemand, as given in full in the January and February numbers for the present year.]

Glüge's method of detecting Urea in the Blood, after the removal of the Kidneys.—By the aid of the microscope, this observer can detect the presence of urea in the blood; for, says he, "Urea in its pure and crystallized state, forms fine needle-shaped, shining, or very slender quadrilateral prisms. After the kidneys were removed from rabbits, I ex-

amined the blood, having allowed it to rest for some hours, by the aid of a power of 255 times; and even twenty hours after extirpation, the blood *presented the two forms of crystallization of which I have spoken.*" In order to avoid every kind of error, experiments were instituted, and the results were always the same.—*Bull. Acad. Sc. and Belles Lettrés, Brux.* 1839, *Part I. p.* 302

Horkel read a paper at the meeting of the Academy of Sciences, Berlin, 17th May, 1841, "On the Microscopic Investigations made by Franciso Stelluti, in the beginning of the Seventeenth Century." This communication is not yet published by the Academy.

Apparatus for viewing the Circulation of the Blood in a very simple and ready manner, adapted for Public Lectures.—This apparatus is composed of a small box enclosing a frog, the tongue of which is easily placed for viewing the circulation of the blood, in the arteries, veins, capillaries, and even in the interior of the follicles. A compound lens is adapted to this box, opposite to a hole which allows the direct light of the sky, or that of a wax candle, according to circumstances, to fall upon it. A low power is sufficient to see the circulation of the blood in the interior of the tongue drawn out of the mouth of the animal, and spread like a membrane. One of these apparatusses presented to the Academy, was constructed by M. George Oberhauser; the other by M. Soleil, optician, after the pattern of M. Donné.—*Comptes Rendus,* 1841, *p.* 799.

Bibliographical Notices.

The employment of the Microscope in Medical Studies; a Lecture introductory to a course of Histiology. By John Hughes Bennett, M. D., Lecturer on Clinical Medicine, &c., Edinburgh. Edinburgh: Machlachlan & Co. London: S. Highley. Dublin: Fannin & Co. 1841. 8vo. Pamphlet, pp. 27.

The time has at length arrived, when it has been deemed expedient to institute a Class in Edinburgh, for instructing the rising members of the profession in the manipulation of the Microscope. This really becomes daily the more necessary, seeing that the scientific practitioners throughout Europe, are resorting at length to this means, with such acknowledged advantage and success. Dr. Bennett has passed some considerable time with Continental Microscopic Observers, and is fully competent to the difficult task he has engaged in, and in which we heartily wish him every success. It will be a matter of surprise to us, if the London Medical Schools do not appoint Professors for the same purpose; and this appears really the more looked for and demanded, seeing that the many sources of error which creep into the experiments made by the tyro, are too apt to cause him hastily to publish results, and thus render more confusion in the science than is necessary, which a few hints from one experienced in making such observations would

tend to obviate, and direct him in the proper path. Indeed, it is somewhat surprising, that the Senate of the University of London, many of whom have distinguished themselves as Microscopic observers, and have gained their laurels by the use of the instrument, have not made it requisite for students in human, vegetable, and comparative anatomy and physiology, to attend at least *one* course, even were it to consist only of *twelve* lectures on the Microscope. Such a proceeding in the Metropolis would materially lead to the most beneficial results, as it would create a desire for investigation among students and professors, who for the most part are ignorant of the *actual* appearance and nature of the structures, of which in theory they may be so well versed. The time is, we feel convinced, not far distant, when the Microscope will be considered as essential as the scalpel in the hand of the anatomist.

Dr. Bennett, in the pamphlet before us, has taken every pains to detail the ignorance which prevails among those who are fully conversant with book-knowledge, and the inspection of plates of structure, but who are entirely unacquainted with the objects themselves, and cites examples in substantiation of his assertions. He then enters, in a very general and popular manner, on the history and importance of microscopic investigations in the study of anatomy, physiology, pathology, and the practice of the profession; in which he gives an excellent though very general summary of the existing state of Microscopic Science in these departments.

To those interested in such details, we strongly recommend the perusal of this pamphlet, and again express our wish, that the laudable object Dr. Bennett has commenced, in the establishing of a Class for Microscopic research in Edinburgh, may be attended with that success it so richly deserves.

The Principles of Botany, Structural, Functional, and Systematic. By W. Hughes Willshire, M.D., Edinburgh, M.B.S., Lecturer on Botany at the Charing Cross Hospital, &c. London: S. Highley, Fleet St. 12mo., woodcuts, pp. 233.

The work before us has been written with a view to supply a deficiency existing in treatises of Botany, for the student in medicine, and graduate of the University. Its title conveys its objects very precisely. The *structural* portion is replete with the most recent important information to the time of its publication, embracing the views of late promulgated by the German and French authors, given in a condensed and abstract form. As a consequence of the manner in which the structural portion is treated, the author's views of the *physiology* of plants deserve equal notice, and exhibit his intimate acquaintance with the subject. The *systematic* arrangement is essentially natural.

An abstract account is given of all those orders, under which the officinal plants are arranged, together with a list of those admitted in the London Pharmacopeia; the general properties of each order are given in a very general though condensed form, sufficient, however, to convey

the principle (which is all that is aimed at) of so important a branch of the subject.

From the reasonable price at which this summary of the existing state of Botanical Science is published, and the really excellent description of its matter, we must admit, the medical student has at length been supplied with all that can be desired.

The Entomologist. Conducted by Edward Newman, F.L.S. London: John Van Voorst, Paternoster-row. 1841.

This was the first of the Monthly Journals which appeared of the size and price of our own, and is devoted to the comprehensive Science of Entomology. We regret there have not as yet occurred in its pages any original observations on the structure of insects which we could notice; it is chiefly confined to the description of species, and the record of notes connected with the capture of insects, and for these particulars recommends itself particularly to the attention of practical men.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

November 24th, 1841.—*N. B. Ward, Esq., F.L.S., Treasurer, in the Chair.*

Dr. Hastings was elected a member.

A paper was read from the Rev. J. B. Reade, entitled "A Postscript to the Rev. J. B. Reade's paper 'On the process of Charring Vegetable Tissue, as applied to the Stomata in the Epidermis of Garden Rhubarb,'" in which the author, after alluding to the experiments of Dr. Williams, as communicated to the Society, in August last (see the whole paper, p. 118), which appeared to lead to the conclusion that the process of charring was of very doubtful efficacy in determining delicate structure, and that the overlying membrane in stomata was really nothing more than an inspissation of organic mucus, raised by heat into contact with the glass, and by the pressure extending as a carbonised pellicle from one edge of the aperture to the other. With reference to the point in dispute, the author forwarded with the communication a portion of cuticle, which, after being immersed in alcohol, distilled water, and dilute hydrochloric acid, was, when perfectly dry, examined by a high power, and the membrane distinctly seen; it was more evident after the process of charring, and which process was so conducted as to obviate all error arising from pressure. The tissue was placed on a slip of glass, and submitted to the action of heat without being covered by another slip. Thus, both the supposed sources of error were avoided; the one by the previous removal of organic mucus, and the other by a different manipulation. The paper was accompanied with sketches of the stomata, by Mr. Lens Aldous, the power employed being about 2000 linear. The author concluded by stating, that Dr.

Williams, after seeing the membrane under this power, immediately approved of the process which rendered it so distinctly visible.

Mr. J. S. Bowerbank then read a paper, being "Descriptions of three species of Sponge, containing some new forms of organization," a full abstract of which will be found at page 161 of this Journal. This paper led to much discussion, in which the Author, the Chairman, Mr. Dalrymple, Dr. Willshire, and others, took part.

On the table was the Microscope which the Council ordered for the Society from Mr. James Smith. This instrument possesses many modifications and improvements, both in the construction of its framework and appurtenances, and in its optical parts. We hope to be able at some future opportunity to give them in detail.

Microscopical Memoranda.

David Don on a peculiar kind of Organs existing in the Pitcher of Nepenthes distillatoria.—These organs the late Professor Don named "clathrophores;" they occupy the lower half of the inside of the pitcher, and have been described by Treviranus, Meyen, and Korthals. Doubts still exist as to their precise function; but it appeared to him probable either that they are the mouths by which the fluid is poured out into the pitcher, or that they are connected with the function of respiration.

The cuticle of the upper surface of the expanded part of the petiole of *Nepenthes distillatoria* is described as destitute of stomata; that of the under surface, as being furnished with numerous oval, or nearly orbicular stomata, composed of two semicircular cellules with rectilinear faces. That of the outer surface of the pitcher is also without stomata, but covered, especially in the young state, with long subulate hairs, frequently dichotomous, or furnished with a spur-like process at their base. The outer surface of the operculum is sparingly furnished with stomata, and clothed with hairs which are frequently branched and fasciculate; the inner has no stomata, but is furnished with clathrophores and clothed with hairs, which are often fasciculate, but mostly simple.

In *Sarracenia purpurea* the cuticle of the pitchers is described as consisting of sinuously-lobed and somewhat stelliform cellules, with numerous small, oval, closed stomata. The fibrous bundles are stated to be composed entirely of long pleurenchyma, the parenchyma adjacent to which consists of beautiful spiral cellules. The hairs of the inner surface of the operculum are simple, hollow, reflexed, subulate, and marked with numerous longitudinal parallel lines or striæ; they proceed from a somewhat elevated base. In the pitchers of *Cephalotus* the stomata are large, oval, and closed; the spiral vessels smaller than in *Nepenthes*, and containing only a single fibre; and the hairs which form the fringed border are simple, obtuse, and transparent.—*Proc. Linn. Soc.* 1840.

Organic Composition of Chalk and Chalk Marl.—The following Table, taken from Mr. Weaver's View of "Ehrenberg's Observations on the Organic Composition of Chalk and Chalk Marl," in Taylor's Annals of Nat. Hist. for June, 1841, p. 311, exhibits the number of Species of Infusoria, Polythalamia, &c., met with in the specimens examined by Ehrenberg: —

	Species of Calcareous Polythalamia.	SPECIES OF INFUSORIA.		Species of Silicious Plants.
		Silicious in Chalk.	Soft-shelled in Flint.	
The *Chalk* of				
Puskary contains	6			
Rügen	7	1		
Jütland	6			
Gravesend	6	3	5	
Brighton	7	1	4	
Menden	9	.....	2	
Cattelica	9			
The *Chalk Marl* of		Silicious	Infusoria	
Caltasinetta	7	27	.....	4
Oran	2	18	.....	1
Zante	5	8	.....	2
Greece	3	9	.....	1
The *Compact Chalk* of				
Egypt	8			
Arabia	6			
The *Nummulite Limestone* of				
The Pyramids of Geza...	6	Containing 4 species of Nummulites, the largest of which is one inch in diameter.		

Death of Mr. David Don.—It is with much regret we announce the decease of this talented and much respected Botanist and observer, which took place on the 7th of December, 1841, at ten minutes to One, A.M., at the apartments of the Linnæan Society, Soho Square. His remains are deposited in the Kensall Green Cemetry.

XXXVI.—DESCRIPTION OF MESSRS. POWELL AND LEALAND'S* NEWLY-CONSTRUCTED ACHROMATIC MICROSCOPE.

The daily acknowledged advantages arising to every branch of Natural Science from the use of the microscope, have induced us to present, after some years' experience, an instrument modified to the present improvements, and more within the reach of scientific observers, than that we have of late constructed, a full account of which, and figures of the one made for the Microscopical Society of London, will be given in a future number of this Journal.

In the following description almost every portion of the instrument is alluded to, and figures of the different parts appended; and it has been our object to give every individual credit for his improvements, where at least we consider them of such importance as to be placed on record.

The points most deserving of attention are the following:—The double pillar, as first made by Mr. George Jackson, which possesses the advantage of being lighter, and distributes the weight more equally upon the foot. We have also introduced a circular motion to turn the body off the stage to examine the object, and to change the object-glass to prevent it from falling upon the object. The stage is made larger and stronger than in former microscopes of this size, and the pinion and screw are of the same diameter as in the larger instrument, above alluded to. This description of stage was first constructed by Mr. Turrell. There are, however, two or three other improvements and modifications, such as the method for adjusting the object-glass to compensate for the thickness of the glass covering the object, &c., which will be found in the description of the Society's microscope.

Fig. 1. *The Microscope in the position for general use.*—The figure forms the frontispiece of this volume. As the most convenient method of using the instrument is in this position, it will be necessary after taking it out of the case, to turn it by means of the pillars on its

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*Mr. Lealand, Mr. Powell's brother-in-law, has for some years been engaged with him in the object-glass and optical department, and is now publicly a partner with Mr. Powell.—*Editor.*

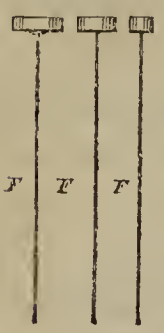
moveable foot, in order that the principal weight may be over one of the feet. When the person using it is standing, and the body of the Microscope perpendicular, it is then firmest as taken from the case.

A. *The coarse adjustment* for the body, which rests on two rollers, and is moved by a rack and pinion.

B. *The fine adjustment,* which is a screw with a cone, against which there is a spring pressing against the cradle, which carries the compound body.

C. *Milled head,* which moves the stage to the right and left.

D. *Heads that move the stage at right angles to the other.* (C) —There is one head on each side of the stage to this motion, in order that both hands may be employed at the same time, one on C, and the other on the opposite side, when a rotatory movement is required to search for animalcules, or other objects. When the two screws, C and D, are used together, a diagonal motion, and when separate, motions at right angles with each other are obtained.



E. *Arm for holding the stops,* FFF, which are used when viewing opaque objects. — To place them for use, push down the mirror G to the extremity of the stem; put the stop into the spring-hole, turn it into the centre of the stage, and raise it as high as the slide on which the object is placed will admit of.

G. *Mirror for illuminating objects.*—When the concave side is used it should be raised nearly to the stem, in order that the rays of light proceeding from it may reach the object before crossing, for by this means the most intense light is obtained. It is invariably used for opaque objects, together with the Lieberkuhn. At night it will be necessary to use the larger condensing lens, which should be placed at about its focal distance from the lamp, with its convex side to the mirror, and adjusted till the rays of light fill it.

H. *Spring-piece for holding the slides on the stage.*—The most convenient mode of placing them is, to push up the spring-piece sufficiently high to allow the slide to go on the stage, and then compress it until it holds it. Any number of slides of the same width may then, after it has been set, be put in without that trouble. Should the slides be very wide, in order to have the whole range of the stage, it will be necessary to observe if the centre of the slide corresponds with the line on the centre of the stage; if not it must be altered until it does.

Fig. 2. *Achromatic Condenser.*—This is adapted under the stage. It

will be observed there are two notches in the plate, capable of admitting the two springs on the condenser; put it in, and turn it till the milled head is in the best position for use; bring your object into focus, and adjust the condenser till you see distinctly the image of the lamp, or the frame of the window, if by daylight; and then you may be assured the most intense light is obtained, which is not always desirable. The light is lessened or diminished by turning back the condensing lens, by means of the milled head.

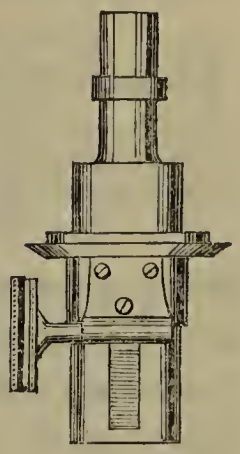


Fig. 2.

Fig. 3. *Micrometer for measuring objects.*—The upper part of the stage is taken out of the plate, put into the micrometer, and the whole put again on to the stage. To measure an object, observe that the micrometer stands at nought; then adjust one edge of the object till it comes in contact with the web in the eye-piece, by the milled head C; then adjust it across by the head of the micrometer D, when the number of revolutions and points may be taken.

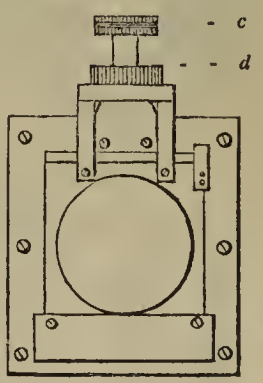


Fig. 3.

Fig. 4.

Fig. 4. *Plate on which Frogs or Fish are tied to examine the circulation of blood in the vessels.*

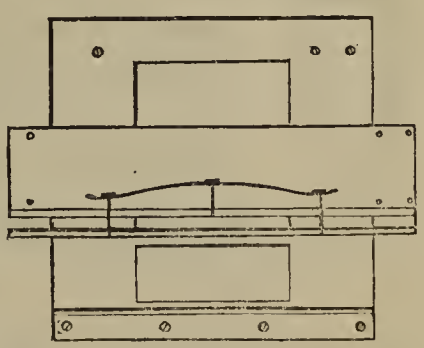


Fig. 5.

Fig. 5. *Large Stage, used when the Frog Plate is used.*—To examine the circulation of the blood in the web of the foot of the frog, or the tail of a fish, it must first be enclosed in the bag; then fastened on the plate by the holes in either side of it; then tie some thread to about four of its toes, and spread the web out by fastening the ends through the holes in the plate.

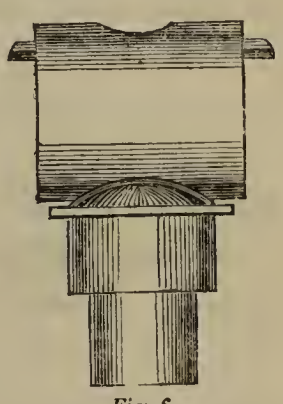


Fig. 6.

Fig. 6. *Phial holder for viewing Chara, &c. while in a living state.*—It is adapted to go in the plate of the stage, and is put in after taking the upper part of the stage off.

Fig. 7. *Small Condensing Lens for viewing opaque objects by direct light, the stem of which goes into the hole* (I).—The larger lens should first be made to throw as intense a light as possible on the objects, and the small one should intercept the rays at about two inches from the object. When the large lens only is used, which is the case when viewing opaque objects by daylight, it should be placed at about three inches from the object, with its plane side towards it: this produces light intense enough for many objects, without the smaller one; but when that is used, the plane side of the large lens should then be towards the lamp.

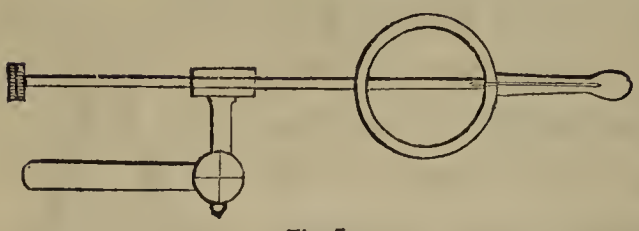


Fig. 7.

Fig. 8.

Fig. 8. *Diaphram for cutting off extraneous light when viewing minute transparent objects.*—It is adapted under the stage, in the same manner as the achromatic condenser.

Fig. 9. *Diaphram of French construction.*—Which is used in front of the lamp, to cut off extraneous light, and intercept the rays before they reach the mirror. It goes into the stem of the *large* condensing lens, which is easily drawn out, and the diaphram substituted. It should be placed at about eight inches from the mirror, and if an image of the aperture is obtained in the body, but a small portion of the field of view will be illuminated. The size will depend upon which aperture is used, and the relative distances of the mirror from the object, and the diaphram from the mirror; it is useful, when any very delicate structure is to be observed, as the darkness around the object renders the markings more distinct.

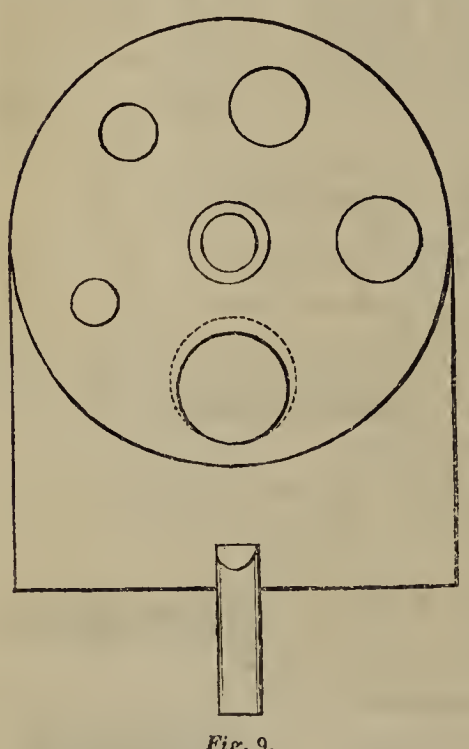


Fig. 9.

Adjusting Object-glasses.—These are made to adjust, in order that they may be as perfect for viewing objects covered with glass, as those that are not. As it is of material consequence that the object-glass should adjust to suit the various thicknesses of glass that are used, and as it is impossible to measure accurately the thickness, the best method to adjust the object-glass is this:—Place it at the point for viewing objects uncovered, which will be known by observing that the circular line under the word *uncovered* corresponds with the fixed line; or, the more ready

way is, to adjust it down as far as it will allow, as we always make them to stop at the corrected point. Bring the object into focus by the adjustment of the body, then adjust the object-glass till the upper surface of the glass which covers the object is in focus; this can very readily be done while the person is observing, by taking between the finger and thumb the milling on the object-glass, and turning it to the left; then bring the object again into focus by the body, and the adjustment is perfect. For the principle of this important method of correcting object-glasses for looking through glass, we are indebted to Mr. Andrew Ross.

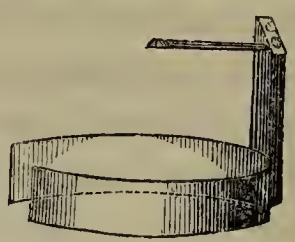


Fig. 10.

Fig. 10. *Steel Disc, by which Drawings are made.*—To use it, place the body of the Microscope horizontally, take the cap off the eye-piece, push on the disk to the line marked upon the long eye-piece, and adjust it till the arm is horizontal.

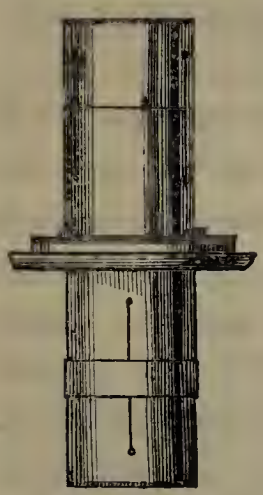


Fig. 11.

Figs. 11 & 12. *Prisms for polarizing or decomposing the Light.* — One (Fig. 11) is adapted under the stage, in the same manner as the achromatic condenser, the other in the body of the Microscope, the draw of the body is taken out, and the prism screwed in, and the draw replaced. The polarization of light can be seen by turning round the draw in the body, or the prism under the stage: the latter is generally preferred as being the most easy.

Fig. 12.

[The price of the Instrument above described varies from forty to sixty guineas, depending upon the number of powers and apparatus attached thereto; a very complete Microscope, however, of this kind may be obtained for about forty-five guineas.—*Editor.*]

XXXVII.—ON THE EXISTENCE OF CRYSTALS OF CARBONATE OF LIME IN THE EGG-SHELL OF THE ALLIGATOR.

By Dr. Henry Johnston, of Shrewsbury.

In the September number of this Journal (p. 108), it is stated, on the authority of M. Turpin, that the particles of carbonate of lime which give substance to the shells of birds and reptiles, are deposited in confusion, molecule by molecule, and not in a crystalline form, as occurs in the eggs of *Cryptellæ* and *Helices*.

I am unable, at present, to obtain access to the original paper of M. Turpin, and therefore, to ascertain whether he examined particularly the egg-shell of the alligator; but I infer that, as one of the reptiles, his observation equally applies to that animal.

Some eggs of the alligator having recently been given to me, I was curious to examine the structure of the shell, and I was much surprised, knowing what M. Turpin had written on the subject, to detect in them, what appeared to me, decided indications of a crystalline arrangement.

The egg-shell of the alligator consists of two layers. The inner is thin and flexible, not at all crystalline, and indeed seems to be merely the inner membrane dried.

The outer layer is thicker and stronger than the former. Its exterior is smooth, and its interior studded with minute eminences, visible to the naked eye. These appearances may be seen in the following manner:

1. If the light be allowed to fall obliquely on the thin broken edge of this layer, minute shining points, or *facets*, are seen here and there, with the assistance of a single lens of low power,* or, still better, with the higher power of a compound microscope.

2. When viewed as an opaque object, with an achromatic power of about fifty linear, the inner surface is seen to consist of an irregular semi-transparent mass, having quite a crystalline appearance, although no regularly formed crystals can be perceived. Among the minute eminences above mentioned, many slender white fibres are seen, looking much like acicular crystals, but which are not, I think, really such.

3. The crystalline structure is best seen, by carefully crushing a portion of the outer layer in a mortar, and then examining the powder as an opaque object, on a dark ground, with a power of about fifty linear, or more. The particles are clear and transparent, almost like crystal; they are not amorphous, but have a great tendency to break into more or less regular fragments, bounded often by straight lines, and the fractures are clear and shining.

Although I have not been able to discover the regular rhomboidal crystals which M. Turpin has elsewhere detected: yet, I think it is proved by these observations, that the substance of the egg-shell here spoken of consists of particles of carbonate of lime, so disposed as to form not an amorphous mass, but a crystalline structure, such as we see in loaf-sugar, white marble, &c. The inside shell is almost entirely animal matter, and leaves but little residuum when burnt upon platinum.

It is with the greatest diffidence that I advance an opinion in any

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* A Coddrington lens of thirty linear.

way contrary to the conclusions of M. Turpin, I am however induced to communicate these few remarks, in order to draw the attention of English microscopists to the subject.

Hints to Microscopists.

III.—ON PRESERVATIVE SOLUTIONS FOR MOUNTING ANIMAL STRUCTURES.

By Daniel Cooper, Esq., Surgeon, &c.

Goadby's Fluid for mounting Animal Tissues.—Mr. Goadby, whose name is familiar to most of our readers, has lately received a gold medal, from the Society of Arts, for his fluid-preparation for preserving animal structures, and thus supplying at once a ready, cheap, and effectual means to the microscopist of mounting animal structures with the greatest possible ease and security, and affording the anatomist and physiologist that which has been for so long a time a great desideratum. The following is the receipt for making Mr. Goadby's fluid: —

4 Ounces of *Bay Salt*.
2 —— of *Alum*.
4 Grains of *Corrosive Sublimate*.
2 Quarts of *Boiling Water*.

These ingredients are to be well stirred, and the solution finely filtered.

Preparations immersed in this fluid are reported to keep their colour well, even those possessing a very delicate rose tint. I have examined the blood-corpuscles, and various other normal and abnormal secretions, which had been preserved for upwards of a fortnight in it, without suffering any material alteration either as regards their form or colour. This solution is also applicable for preserving zoological objects generally. When mounting objects for the microscope, provided they are not thick, place a few drops of this fluid upon a piece of glass, on which the object has been previously put, and cover it with a portion of thin glass, wipe at the moment all the superfluous moisture from the edges of the surrounding glass, and by means of a brush apply japanner's gold size, so as to cover the upper and under glass to the extent of the eighth or sixth of an inch all round. By adopting this means, the fluid in which the object is placed is prevented from evaporating, and exercises its preservative influence over the enclosed object.

The Gannal process for preserving animal structures from decomposition, consists in injecting with, or immersing objects in, a solution of

the *super-acetate of alumina*. There is, however, the *same* objection, though to a greater extent, to the use of this fluid as to the salt water.

A mixture of salt and water was first recommended by Dr. Cook for the same purpose, and has been known for more than twenty years. There is a serious objection to the use of this solution for microscopic preparations, owing to the development of a *Confervoid* vegetable, as noticed by Mr. Bowerbank, at p. 159.

Mr. J. T. Cooper some years since made some experiments with a view to determine the best fluid for preserving vegetable coloured tissues, such as some of the smaller Fungi, and found that *salt and water*, to which *acetic acid* had been added, answered extremely well for this purpose. This solution might probably answer for mounting dissections of vegetable structures.

Kreosote and oil of copal, with the above, have likewise been tried, but have not been generally used, probably on account of the difficulty of obtaining the former free from colour, and the expense of both, compared to the simple ones above described.

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

Will on the Compound Eyes of Insects and Crustacea.—Some excellent researches, illustrated by good figures, have been published on this subject, by Will of Leipsig. The author found the investigation more convenient in subjects prepared in spirit than in fresh ones. The facets of the cornea are hexangular in all insects, but in Crustacea sometimes quadrangular, sometimes hexangular; quadrangular in *Palæmon serratus*, *Galathea strigosa*, *Astacus fluviatilis* and *marinus*, *Palinurus locusta* and *Pasiphæa squinado;* hexangular in *Squilla mantis*, *Pagurus bernhardus*, *Portunus pubes* and *Ilia nucleus*. The two eyes occasionally vary in size. In the *Libellulæ* the facets in the upper part of the eye are at least one-third larger than the rest. In the *Gryllotalpa vulgaris*, those on the border of the cornea are about one-third smaller than the others. The cornea is made up of prisms, or truncated pyramids, corresponding in number to that of the facets. Each pyramid presents, on a vertical section, oblique striæ, usually more than five, probably the edges of horny plates placed upon one another. In *Ranatra linearis*, *Naucoris cimicoides*, *Cicada orni*, *Tabanus bovinus*, there are found external and internal layers; the former transparent, the latter less so. The surfaces of both extremities of the corneal pyramids are always convex, or at most level, but never concave. In *Galathea strigosa*, *Palæmon serratus*, *Astacus fluviatilis*, and other Crustacea, the external extremities of these pyramids are very slightly convex, the internal even. In *Cetonia aurata*, *Melolontha vulgaris*, *M. fullo*, *Calosoma sycophanta*, *Dytiscus marginalis*, *Staphylinus erythropterus* and

Gryllotalpa vulgaris, both ends are convex; the internal, however, much more so than the outer. In *Locusta viridissima* both are very slightly convex. In *Mantis religiosa* almost even. In *Vespa crabro*, *Apis mellifica* and *Bombus*, convex, the inner most so. In *Æschna grandis*, *Agrion virgo*, *Libellula depressa*, slightly convex, the inner being much so. In *Cicada orni*, slightly convex, the inner strongly so. In *Cossus Ligniperda*, *Sphinx Atropos*, *Pontia Brassicæ*, *Vanessa Urticæ*, *Musca domestica*, and *Tabanus bovinus*, slightly convex, the outer appearing more so. In *Apis mellifica* and *Vanessa Urticæ*, between the facets are observed simple hairs, which extend to the inner surface of the cornea, and are placed irregularly. In *Vespa crabro*, on the inner surface of the cornea, at the border of the facets, are formed short, rounded striæ, probably indentations. The number of facets in each eye are in *Galathea strigosa* 5400; in *Melolontha vulgaris* 6300; in *M. fullo* 9400; in *Calosoma sycophanta* 4030; in *Locusta viridissima* 2000; in *Bombus* 4000; in *Æschna grandis* 10,000; in *Cicada orni* 11,600; in *Cossus ligniperda* 8100; in *Sphinx Atropos* 12,400; in *Vanessa Urticæ* 4500; in *Musca domestica* 4900, &c., &c.—*(To be continued, as soon as the next Part comes to hand.)*

New form of vessels in Plants.—Under the name of *Dichotomous vessels* are described by Calamai (Annales des Sciences Natur., Vol. XIV, p. 317) certain constantly forked vessels in plants, which are probably identical with the so-called Latex vessels.—p. 75.

Bibliographical Notices.

Illustrations of Arts and Manufactures. By Arthur Aikin, F.L.S., F.G.S., &c., late Secretary to the Society of Arts, London. J. Van Voorst, 1840. 12mo, pp. 372.

The materials this interesting little work contains, have been selected from a series of papers read before the Society for the Encouragement of Arts, Manufactures, and Commerce in London, by the much esteemed and respected Secretary, Mr. Arthur Aikin, who for twenty-four years held that office, and communicated many important papers, from which the work under notice has been written.

The subjects treated of are :—1, Pottery; 2, On Limestone and Calcareous Cements. 3, On Gypsum and its Uses. 4, On Furs and the Fur Trade. 5, On Felting and Hat-making. 6, On Bone. 7, On Horn, Tortoiseshell, and Whalebone. 8, The Antiquarian History of Iron. 9, The Metallurgical History of Iron. 10, On Engraving and Etching. 11, On Paper.

Of this list, there is one article which is interesting to the Microscopic observer, viz. the chapter on Felting. The various hairs used for this purpose are neatly figured from drawings made by Mr. Cornelius Varley. The micrometric measurements are added to the interesting matter which accompanies each figure, and adds very much to the general value of the work.

A special work on the Arts and Manufactures has long been a desideratum: this, Mr. Aikin has supplied so far as the extent of the present volume will allow. We can but speak in its praise, both as regards the style in which it is written, the manner in which it is got up, and the delicacy of the illustrations.

The Literary and Scientific Register for 1842. *By J. W. G. Gutch, Surgeon, &c.* London: Suttaby & Co., pp. 120.

This work, bound as a pocket-book, contains, in a condensed form, a variety of practical information in astronomy, botany, chemistry, medicine, meteorology, zoology, and science in general, and *blank ruled pages for a Meteorological Register*. As a compendium for general reference on scientific subjects, it is deserving a place in the pocket of scientific men.

Microscopical Memoranda.

Hair of the Moose-Deer.—In plate I. of the present volume, is a diagram representing the appearance of transverse and longitudinal sections of the hair of the Moose-Deer, forwarded by Mr. G. Busk; in them the *external fibrous sheath*, the *regular cells*, and the *internal enlarged cells*, which open into each other, may be well seen. This figure will be again alluded to, when Mr. Busk's notes and series of illustrations of the hairs of numerous animals are inserted.—*Editor.*

Gill's Notice of a similar Growth on the dead Larva of a Gnat, to that recorded by Dr. Stilling on living Frogs.—In reference to the case mentioned, at p. 139 of our Journal, by Dr. Stilling, "On the formation of Contagious Conferva (?) on living Frogs," we beg to state, that on referring to the Technological Repository, Vol. V., 1829, a similar growth is described and figured by Mr. Thomas Gill, which occurred on the body of a dead larva of a gnat. We extract the description, as given by this observer, for comparison:— "The production of transparent tubes, filled at their ends with small spherical bodies, was apparent; which tubes burst as the water gradually dried up, and these spherical bodies swam about in all directions in a lively manner, the ends of the tubes generally remaining empty, and quite pellucid; orifices or openings at their ends, through which the spherical bodies had been protruded, being also visible; the extremities of others were filled with these spherical bodies. Others of the tubes also ramified and divided themselves into branches, proceeding from the main stems." The rapid growth of these filaments is particularly referred to by Mr. Gill. He further adds (Vol. IV. p. 331), that the rudiments of these tubes were found adherent to those very recently dead, so that they seem to prey upon them in the manner of other parasites; and instantly upon their death, to commence their work of decomposition.—*Editor.*

Erratum.—At page 148, for "Scale $\frac{1}{8000}$ of an inch," read $\frac{1}{3200}$ of an inch.

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Journal of the Royal Agricultural Society of England, 36.
London and Edinburgh Monthly Journal of Medical and Surgical Science, 138, 169.
Medicinisch Zeitung, 147.
Memoirs de l'Acad. Instit., Paris, 157.
Müller's Archives, 71, 92, 138, 146, 169.
Newman's Phytologist, 96.
Oken's Isis, 1839, 26, 42, 75.
Philosophical Magazine, 128.
Poggendorf's Annalen, 107.
Proceedings of the Zoolo. Soc. of Lond., 112.
——————— Linnæan Soc., 89, 128, 175.
Proceedings Roy. Soc. Edin., 64.
——————— Lond., 31, 32.
Revue Zoologique, 46, 62, 77, 93, 104, 157.
Schlechtendahl's Linnæa, 167.
Transactions of the Geological Soc. of Lond., 99.
Valentin's Repertorium, 24, 41, 76, 146, 155, 167, 184.
Wiegman's Archives, 46, 95.

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